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Original Correspondence.

IRONWORKS AND COLLIERIES IN DERBYSHIRE.
THE DRONFIELD IRONWORKS.

About the oldest works in Derbyshire are those of Messrs. LUCAS, at Dronfield, a pleasant village about six miles south of Sheffield, and midway between that town and Chesterfield, on what is now known as the direct Midland line. The place, however, is about to become far more important than it has yet been by the extensive works now being erected by Messrs. Wilson, Cammel, and Co., principally for the production of Bessemer steel, of which there is expected to be a weekly output of upwards of 1000 tons, as 15 converters, of 6 tons each, will be kept going. The Messrs. Lucas have recently much enlarged their works, and in connection with their boilers have an apparatus for consuming the smoke, the same as at many other places. The making of the village into a town—or something very much like one—has, however, evoked no little opposition from two or three persons, on the ground of the quantity of smoke likely to be made from the two works, objections now being confined to those of Messrs. Lucas. We may say that on our visit to the works, a few days since, nothing could be more satisfactory after leaving the dense masses of smoke hanging over Sheffield than the scarcely perceptible issue of it from the Dronfield Works. It is not, however, likely that the interests of nearly a whole community, increased by upwards of 700 families, by whom the tradesmen, large and small, will be benefited, not only by means of the support they will receive from such a large body of customers, but by the inevitable lessening of the rates, will be in any way jeopardised at the desire of two or three persons who wish to have their residences kept in their present privacy. It is admittedly true that the rural aspect of the place is being changed—and for the better, as the agricultural labourer is fast disappearing to make way for the well-paid mechanic, engineer, and smith.

The works of Messrs. Lucas have an historical reputation, as their predecessors were the first to introduce the system of malleable castings now in use at the works, as well as at those in various parts of the kingdom and in Europe. At them were brought out the first malleable castings in the country. So far back as 1794 Sam and Thomas Lucas took out a patent for casting pig-iron, the same as now carried on by their descendants at Dronfield. The process was confined to small castings, and consisted in melting the broken pig-iron in a crucible in the intense heat of an air-furnace until it had been made as fluid as water, and then running it into the most delicately formed moulds. By this means many articles, so finely finished that they are taken for forgings, are produced. Risers, nut-crackers, snuffers, locks, spectacle frames, and similar articles are made by the process mentioned, as well as much larger ones, for which there is a very great demand. The patent of Messrs. Lucas was one in which carburized iron was converted into pure iron. In a cylindrical pot or pan—say, 20 in. deep, and the same in breadth—the bottom being covered with a thin layer of fine hematite iron ore finely ground, a layer of the castings was placed close together, but not so as to touch each other; next there would be a layer of ore, with another layer of castings until the pot or pan was quite full, but having a layer of ore at the top. When a number are so filled they are put into ovens surrounded by flues of fire-brick kept at a great heat, which is raised to its highest point when the oven is thoroughly closed. They are kept there from three to five days, when the oxygen of the ore being set free mixes with the liberated carbon of the castings, becoming carbonic oxide. The gases are then burnt until all the carbon is exhausted, the fires are cooled down, and the castings come out malleable.

The works of Messrs. Lucas have undergone considerable additions of late years, whilst a new forge, detached from the other works, has been erected. One of the principal departments is that of spindle turning, used in the manufacture, or rather spinning, of flax and jute. The room is a long and lofty one, with about 60 small lathes, and a number of hands are employed both on flyers and spindles. There are also a double set of benches, everything being fitted up in the most complete manner. Adjoining the last-named place is the spindle finishing shop, with screwing and other machinery. In the forging shop are several forging machines, by Ryder Brothers. By a very simple process the spindles are reduced to any desired size, the circular form being mathematically correct, eccentrics being used. There are also mechanics' shops, with the usual lathes and tools, including planing and other machines. The casting shop is a very commodious one, and a great deal of the work formerly done by moulders is now performed by what are known as casting machines, by which the work formerly requiring a man, can be as well and as easily done by a boy after a little practice. Some of the castings made by the Messrs. Lucas vary in weight, some of them being as much as 25 cwt. In the place there is a great variety of castings being made, some light and tasteful, including coffee and small chopping machines, spanners, and corf wheels. There is also a large blacksmith's shop, with several fires, together with store and other rooms. For the works there are a pair of condensing engines of considerable power, with two large boilers with apparatus attached. There are six annealing furnaces, but to prevent any emission of smoke, which might be injurious from being so near the surface, they are all flued into a larger stack erected for the purpose.

The forge is a new building, and at some distance from the spindle and casting shops. It is well fitted up in every way. In it are two large hammers, whilst a third is about to be put down. A large iron cutter and squeezer is also in the principal place. The building will be more than 30 yards in length, divided into two longitudinal compartments, but open, and have been very well arranged for the work principally carried on in it—shovel making—the Messrs. Lucas having a very high reputation all over the country for their steel shovels, and at the present time cannot produce them fast enough. The building contains 20 large fires, with about 60 anvils. In connection with the fires there is a fan by which they are kept going, being driven in the usual manner. The motive-power is obtained by a pair of horizontal engines, each of 25-horse power, with a couple of ordinary boilers. At the present time upwards of 150 persons are employed at the foundry alone, which is very far short of the usual complement.

Whilst carrying on the old-established works, handed down to them by their own family, Messrs. Lucas adopted a very wise course in producing their own fuel, seeing that they were residents of a district noted for its black shale, or Silkstone coal, of which, before the opening of the Midland Railway from Sheffield to Chesterfield, a large quantity used to be carted into the former town for the use of manufacturers and others. At no great distance from the works they have a colliery to the Silkstone coal, only 55 yards deep. There are two shafts, each 11 feet in diameter, with the usual head-gearing, the ventilation being produced by means of the ordinary furnace. The engine is a vertical one, with boiler, &c., complete. The firm are also large producers of coke, having no less than 28 ovens, all that they make, of course, at the present time being in great request, and at prices, we presume, that must be highly remunerative. Messrs. Lucas, we may also say, have marked out the site for a new colliery, quite close to the line of railway, and which will be sunk to the black shale, or Silkstone seam.

In conclusion, we may say that within the radius of a mile of Dronfield there is a large and rapidly increasing population, to a great extent owing to the partial opening out of the vast mineral wealth which runs through the Unstone Valley. A very large number of houses are being built, and everything bespeaks the formation of a town that will be of no mean importance, seeing that there is around it vast and valuable beds of ironstone and coal, with a large ironworks in full operation, and a Bessemer establishment in course of erection, that will probably be at work in something like three months, and find profitable work for hundreds of hands.

THE MINES AND WORKS OF GERMANY—No. IV.
SMELTING.—(Continued).

In our last article we spoke of the reduction of zinc ores, and of their manufacture into metal. In visiting the silver refineries at St. Andreasburg we were fortunate to find three furnaces in full operation, one just out for repairs, and a new one ready to start. At these works they reduce ores from Mexico. They consist of native silver, chloride, and sulphides of variable composition. The ores, partially dressed from impurities, come over in small bags, containing each about 2 cwt. The matrix is chiefly dolomite and quartz.

Two systems of reducing silver ores are in common use; the one consists in mixing with the silver ore a suitable quantity of galena, then smelting down into a rich argentiferous lead, from which the metallic silver is subsequently obtained by cupellation. The other, which is extensively practised in the Erzgebirge, is effected by reducing the ore to the form of a chloride, then, by the addition of mercury, obtaining an amalgam, from which the mercury is easily separated by sublimation. Both these methods depend on the affinity of another metal for silver; but the amalgam process is not advantageous when the ores contain any considerable admixture of copper. The first of these methods is pursued at St. Andreasburg. The ore is first dried and ground, six heads of stamps being here employed, then mixed with a quantity of galena from the neighbouring mines, and projected into a tall furnace, surmounted by a hopper. Each furnace was 8 ft. by 5 ft., and 14 ft. in height from the floor to the hopper. The blast, worked by a water-wheel, was supplied to each furnace by four tuyeres, slightly inclined to the hearth, each directed towards the centre, to equalise the heat. The result of this operation is a rich alloy of silver and lead, which is run out into small basins, of about 18 in. diameter, placed on the floor to the left of each furnace. The cakes of metal, now averaging 600 ozs. of silver to the ton of lead, are thence wheeled by the workmen to the refining furnace, in another building. The ores employed in these furnaces vary from 0.2 to 6 per cent. of silver. The galena used, being the poorer varieties of ore, never exceeds 30 per cent. of lead. The Mexican ores contain, in addition, a portion of gold, in some of the samples ranging from 0.005 to 0.01 per cent. The fuel employed is coke. Each charge is tapped off once a day, and these five furnaces produce daily 66 lbs. of metallic silver and about 2 tons of lead.

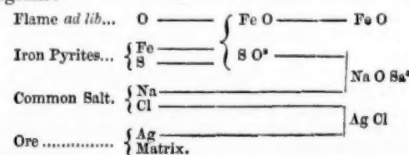
The next process is simply cupellation on a large scale. In the refining-house there were two furnaces, the one to cupel, the other to reduce the litharge formed during cupellation. This operation in ancient times, as to-day among the Aztecs of La Plata, was carried on, somewhat ludicrously, by melting the silver-lead in a crucible; while a number of natives sit round, each blowing upon the lead through a hollow cane! At these works they cupel a charge each day. The principle involved is that silver is not oxidisable to any appreciable extent by exposure to heat when in the presence of a substance that readily combines with oxygen. The alloy of silver and lead then being exposed to a melting heat, with free access of air, the surface is covered with oxide of lead, which continually renews as often as it is removed, until the lead of the alloy is exhausted, and the pure silver remains in the crucible. The process was conducted at Silberhütte in a reverberatory furnace, about 5 ft. high, and so arranged that the flame and hot air from the fire-place, on the right of the apparatus, after overtopping a fire-brick bridge, or low wall, might impinge directly on the surface of the cupel, and then pass up the flues. The manufacture of the cupel, or test as it is technically termed, is a peculiar operation, requiring considerable practice and dexterity. It consists of an iron frame, somewhat oval, about 3 ft. by 3 ft. 9 in., tightly filled in with bone-ash, moistened, to make it adhere, with a little alkaline solution, generally the crude potash of commerce. When finished the test has the appearance of a large shallow dish, with sides smoothly scraped, and having at the front a depression, or lip, from which the litharge flows as fast as it is formed, forced over by a blast. The due regulation of this blast, which at Silberhütte is supplied by a separate water-wheel, is a very important part of the refining process. If it be too strong it cools the surface of the lead, and forms so thick a coating of litharge as to effectually prevent the further oxidation of the metal. And if the blast be too feeble, the lead oxidises so slowly that a notable quantity of silver is lost during the operation.

The first heating of a fresh cupel has to be effected with great care, for fear the test should crack and become useless. When gradually brought to a low red-heat the cupel is filled with the re-

melted cakes of lead alloy, coming from the reduction furnaces, and containing 14 per cent. of the precious metal. The surface of the molten mass is now acted upon by the blast coming through a tuyere on the far side of the hearth. A scum immediately forms on the metal, and is pushed forward by the force of the wind to the front, and escapes over the lip, and down a pipe, to a vessel placed beneath to receive it. To make this method effective, it is clear the surface of metal in the test must remain about the same level. With this object, from time to time additional portions of melted lead are poured in, to maintain the bulk at the same level. Formerly the whole of the oxide, from the beginning of the operation, was allowed to sink into the substance of the cupel, thus requiring a large test to refine a moderate amount of silver. By the method of running off the litharge much larger quantities can be treated, and the same cupel serves many times. When the alloy has enriched to a few thousand ounces of silver to the ton a hole is pierced in the bottom of the test, and the liquid run off into ingots. The hole is then plugged up, and a fresh charge introduced. These rich ingots are then re-melted, and exposed in another cupel, deeper than the first, and not provided with the lip. Here the whole of the combined lead is absorbed by the bone ash, and a cake of pure silver results. At Silberhütte the cakes of alloy are often rich enough in silver when they come from the reduction furnace to be treated in the second without passing through the first cupel. On this account, also, the director of these works informed us they could not, with advantage, use the Pattinsonian process, their cakes of alloy to refine being nearly as rich in silver as Pattinson's process would leave them.

The silver produced here is chiefly consumed for coinage, and is rolled and stamped in the district. Throughout the Hartz Mountains the inhabitants, who are all employed in the mines, or in forest and other operations connected with mining, are paid on a Saturday night in coins made of the silver and copper they have themselves mined, dressed, smelted, and rolled during the week.

Near Freyburg, in the Erzgebirge, are the largest works, which refine silver by the method of amalgamation. We had not leisure time sufficiently to examine in detail these extensive works, but we will indicate the general outline of the process. The ores contain besides various salts of silver, copper and iron pyrites, blende, galena, and frequently antimony, arsenic, bismuth, cobalt, nickel, and gold. Those ores containing on assay less than 50 ozs. silver to the ton of ore are reduced separately from the richer varieties. By this method advantage is taken of the iron pyrites present; and if the quantity of iron sulphide be greater or less than necessary—one-fourth by weight—the surplus or deficiency is adjusted before commencing. The dressed ores are next intimately mixed with one-tenth their weight of common salt, and sieved; then introduced into a reverberatory furnace, where they are spread by a workman evenly over the hearth. At first the heat is gently applied, to drive off the water, the mixture meanwhile being continually moved about, after the fashion of iron puddling. This constant stirring is kept up the whole time the material is in the furnace, partly to equalise the heat, and partly to expose every portion of sulphur to the oxidising influence of the flames. The temperature is next raised, and the colour of the mass becomes darker. When the last traces of sulphurous vapour are expelled the heat is again increased for a little time, and the charge withdrawn into iron vessels. The chemical changes involved are said to be these:—The sulphuret of iron oxidises at a red heat, forming sulphate of iron; whilst at the higher temperature the sulphate of iron and common salt are mutually decomposed, forming sulphate of soda and oxide of iron; chlorine being evolved, which seizes upon the silver and other metals, forming chlorides. The chemical changes will be best perceived by the following diagram:—



During this calcination the charge loses one-tenth of its weight. The mixed chlorides from this furnace are next sieved, and passed under heavy rollers, to reduce to a fine powder. The next process, which is the characteristic portion of this method, is carried on in very strong barrels, a little larger than our English 36 gallons, and firmly hooped with strong iron bands. A shaft passes through the centre of each barrel, which admits of being put into motion by the water-wheel. At first the barrels are one-third filled with water; afterwards about 1/2 ton of the fine ore is added, through a hopper and tube, standing directly over each barrel, and a shovel full of small pieces of iron. The bung being secured, the arrangement is made to revolve slowly. After being thus thoroughly mixed into a thin paste a quantity of quicksilver is poured through the hopper into each barrel, and again they are set in motion, but this time a little faster. This is kept up for eighteen hours, the apparatus being stopped every few hours during the early part of the process, to see that the paste is of the proper consistency. When the amalgamation is judged to be complete the barrels are filled up with water, and then made to revolve so slowly as to allow the mercurial mixture to remain at the lower part of the barrel, and keep the lighter silty matters only in suspension in the upper part of the barrel. The amalgam being now separated, and occupying the bottom of the barrels, they are stopped, with the bungs downward, to each of which there has been screwed a hose-pipe fitted with a stop-cock. The workman then runs off the amalgam, stopping the flow the instant any of the slime appears. The muddy water is next run off into slime pits, whence those portions containing any appreciable amount of silver are added to the ores, to be treated again.

Each 1 lb. of silver produced requires the expenditure of 4 ozs. of iron and 1 oz. of mercury; but the expenditure of fuel is much less than by the lead process. The amalgam, after being filtered from the uncombined mercury, is distilled in iron retorts. The quicksilver passes over in a state of vapour, and condenses in the receiver. The mercury thus obtained is used again, but, from various causes, a loss of about 6 per cent. is experienced. The residue in the iron retorts is an impure silver, and is refined by wetting in an open ladle. When liquid, powdered charcoal is thrown upon the surface, which,

joining with the impurities, forms a scum. This is repeatedly removed, until the metal is of sufficient purity for commercial purposes. Flues are provided over each of these smelting hearths, and the matters deposited are, at intervals, carefully cleared out and added to the other ores. This method of amalgamation is the process of silver refining referred to in our article last week on "The Mineral Resources of Japan," as having been recently adopted in that country under European management.

OUR COAL SUPPLY—BOG TURF IN CORNWALL.

Sir,—This question being of great interest, and Mr. Willett, of Brighton, being about to ascertain by boring what is the nature of the strata immediately beneath the Wealden formation in Kent, the following extracts from "The Coal Fields of Great Britain," by E. Hull, B.A., may be interesting as bearing upon this subject:—

"The southern margin of this land surface is even more difficult to define than the northern, and it is, therefore, impossible for us to determine with any degree of certainty whether any part of that large tract lying between the valley of the Thames and the coal fields of the central counties is underlain by productive coal measures." Respecting the district south of the Thames, he says:—"It has been seen that the coal fields of Belgium and France stretch in the form of a deep trough from Liege towards Boulogne. Here we lose all trace of the carboniferous rocks till we reach Somersetshire, where we find the axis of upheaval along the range of the Mendips, directly in line with, and corresponding to, that of the carboniferous strata of France known as the axis of Artois. Hence it has been suggested by Mr. Godwin-Austen that the one may be a prolongation of the other, under the Cretaceous and Wealden groups south of the valley of the Thames. In accordance with this theory we might expect a band of coal measures, continuous with that of Somersetshire, to stretch under Salisbury Plain, or the Vale of Wardour, and right across the country towards Dover; and that some such general arrangement of the strata actually exists is highly probable." Again, he says:—"It is a most interesting fact that the strata which compose the coal measures thin away towards the south-east of England, and expand in volume towards the north-west." If we compare the coal measures above the millstone grit of Lancashire with those of North Staffordshire, and this with South Staffordshire, we shall find a gradual lessening in the development of the strata from the north to the south. Of the conclusions, then, we have arrived at this is the sum:—1. The midland and northern coal fields were separated from those of South Wales, Gloucester, and Somerset by a tract of land of old Silurian or Cambrian rocks, the southern limits of which it is not possible to define with accuracy, but it is probable that it included the greater part of the district north of the Thames.—2. To the south of this tract of land lies another, but contemporaneous, system of carboniferous rocks, extending with many interruptions from the county of Pembroke, through those of Glamorgan, Somerset, Wilt, Surrey, Kent, and across the North of France into Belgium.

"It has been already shown that the coal measures of England thin away, and ultimately die out, towards the south-eastern counties, and that most of the region lying between Staffordshire, Warwickshire, and Leicestershire on the one hand, and the Valley of the Thames and Channel on the other, was dry land during the period of the productive coal measures, and is therefore destitute of coal. So that if the district stretching eastward to the sea, and southward to the Thames, were stripped of its covering of Cretaceous, Jurassic, and Tertiary rocks, we should in all probability find a bare tract of cambro-silurian slates and porphyries."

The experiment which Mr. Willett has undertaken will be of considerable interest; but the great question at present is, how to economise coal? and, can anything cheaper be used? The plan of introducing a piece of sheet-iron to cover the bottom of an ordinary grate is one which is by no means new. I tried it some years ago, and found that it effected a saving of the coal, but the fire did not burn so well; this, of course, would be the result, in consequence of the draught from underneath the fire being destroyed. But the truth is, our construction of grates is very faulty, no provision being made for allowing most of the heated air to come out into the room, instead of going up the chimney, as it now does. I have lately seen a small French grate admirably constructed in this respect, the draught of which can be nicely regulated, either to burn fast or slow, and the whole of the heated air (instead of going up the chimney) escapes immediately above the fire-place.

But how about a substitute for coal? Can nothing be done with the hundreds upon hundreds of acres of bog turf by which I am surrounded on the Roughton and Brown Willy moors? I am told that some of the landowners around here have refused to allow any poor man of their parish to cut a single turf. I refer to the parish of St. Breward more particularly, where Sir Matthew Onslow has hundreds of acres of turf, which, in its present condition, is not worth a penny an acre. He will not allow any poor of his parish to cut turf, in order that they may not cut what is termed "skin" turf instead of "the" turf—the former being the turf on the hilly ground, and the latter that in the bogs and lower ground of the moor. If I am correctly informed in this respect, the generosity of Sir Matthew Onslow, under existing circumstances, towards the poor of his parish is not very large. I, however, hope I am misinformed.

WILLY BROWN.

"THE SCIENCE OF INVESTMENT."

Sir,—In one of the City papers it is stated that out of 40 British Mines only 18 are quoted at a premium; while in looking over another similar publication I find the number of mines inserted to be 36, and all of the prices nominal—not a single transaction of business done being recorded. It will be desirable to point out, for the benefit of the mining public, the character of the mines noticed by the Stock Exchange; and I am not stating too much when I observe that what the members of that institution desire and require are rasping terms in prices for the benefit of dealers or jobbers, and two commissions monthly for brokers. Is it not monstrous that Carn Brea and Dolcoath, declaring dividends of 16,000*l.* and 50,000*l.* annually, are not even noticed, while Asherton, Caegynon, Crenverand, Wheel Abraham, Drake Walls, East Grenville, Mynydd Iron Ore, Prince of Wales, and Tan-yr-Alit are conspicuous among the most distinguished? Why should these mines be advertised by the Stock Exchange, and be ranked as examples of the success of British mines, when such enterprises as the following are wholly unnoticed:—Botallack, Cook's Kitchen, Phoenix, East Pool, South Crofty, Boscawell Downs, Foxwell, Minera, New Pembroke, North Levant, West Frances, South Carn Brea, North Pool, West Tolgus, Trumpet Consols, Kitty (St. Agnes), and Wheel Owles? Again, West Basset shares were forced up to 17*l.* rapidly from 10*l.*, since which the price is 9*l.*, a rise of 100,000*l.*, and a reaction of 48,000*l.*. Van reached 80*l.* each, (say) 1,200,000*l.*, the last quotation 37½ to 42½, (say) 40*l.*, or 600,000*l.* for the mine, an advance on cost price of 1,175,000*l.*, and a subsequent decline of 575,000*l.*. And pray what has this mine done since the original purchase for 51,000*l.*? It has made calls of 19,250*l.*, and declared dividends of 109,500*l.*, just a profit of 39,250*l.* over the outlay. The present dividend, 14*l.* quarterly, is equal to 7 per cent. annually on the present quoted price. The sum of 675,000*l.* of the extreme ranges must have been a nominal valuation, even should the property be worth its present price—i.e., 14 to 15 years purchase. Spanish Three per Cents. can be bought at 9 to 10 years purchase. Turkish, Egyptian, with Italian Government Bonds average 9 per cent. Val de Travers Asphalt, 15 per cent. Trumpet Consolidated at 15½, Tincroft at 63½, Dolcoath at 80*l.*, and Carn Brea at 170*l.* pay respectively 13-14, 16-17, 14, and 9 per cent. in two-monthly and quarterly dividends. So far as *bona fide* tin mines are concerned the public need not apply to the share list of the Stock Exchange to secure sound and prospectively good investments, averaging 10 per cent. annually on the market value of shares. In respect to West Basset, there has not been a single dividend declared for years, yet the Stock Exchange grumble because the initiated in mining decline to submit to rasping terms of the market, and two commissions monthly, through dealing in mines selling one day at 3000*l.*, another at 102,000*l.*, and then again down to 48,000*l.*, the actual value of the property being the same throughout.

East Basset, East Caradon, and West Chiverton are again the bright examples of the acumen of the members of the Stock Exchange. The public were allowed to embark in these favoured undertakings at 200,000*l.*, 350,000*l.*, and 250,000*l.*. What are the respective values of the mines this day?—15,000*l.*, 30,000*l.*, and 28,000*l.*. Yet the *Stock Exchange Express* brings forward these mines to establish a comparison with other securities than that of British mining. It would be politic for the interests of the public to abolish the quotations of mining shares in the official share list of the Stock Exchange. It is no guide as to the quality of mines, or the desirability of selecting investments. It is calculated to entrap the unwary, while the earnest and careful investor can gain no clue, through its study, to those undertakings that sell at depressed prices, possess the inherent elements of success, and from which spring the prizes that enrich the industrious and enterprising miner in his onward progress through life. Mining is one thing and speculation in shares is wholly another. The Stock Exchange is a "rat trap," all trespassers are sacrificed, and as there is no law in America to prevent a man from placing his hand in a gin-spring with impunity when attempting to rob his neighbours out-of-pocket, so there is no law in England why a man shall not gamble instead of getting rich through healthy gains.

The papers in the interest of the Stock Exchange, as well as the members of the Stock Exchange, would do well to consult the valuable columns of the *Mining Journal* before they pass judgment on British Mining, or compare the few "jobbing companies" recognised in their list with the *bona fide* and substantial mines constituting

the mineral fields of industry situate in the west, north-west, and northern part of the United Kingdom. R. TREDINNICK, Mining Engineer, 3, Crown-court, Threadneedle-street, London, Aug. 29.

ON PRACTICAL MINING—N. ENNOR'S VIEWS.

SIMONWARD MINE, NOW CALLED ST. BREWARD CONSOLS.

Sir,—I said in my letter which appeared in the Supplement to last week's Journal, "go and see for yourselves," and I expect ere this many have done so; but I will here describe the mine, with my views of it.

There is a lode there, from what is to be seen at surface, from 6 ft. to 30 ft. wide, running from about 6° to 8° south of east, a real copper-bearing direction, dipping south about 1 foot in 6, with masses of hollow cinders like gossan, with many vugs full of sulphurous mud; it is supposed to be in granite from the surface boulders, but the matrix seen is more like a quartzose killas; it lays rather on a slope, or gentle declivity, for nearly half a mile down to the river. An adit can be taken up on the lode that will come in over 50 fms. deep under where the lode is opened upon. I believe it will be even a paying mine long before the adit would get there. Water is rising to surface from the lode, notwithstanding its height above the river Camel. There is a stream of water brought home to where the lode is opened on, and now running down to the river, nearly on the back of the lode; here they have over 50 fms. of a fall for wheels, one over another, with a gentle declivity, and no obstruction in the way, direct on the back of the lode, and a never-failing stream of water from Casport Pool, near Rowton. Notice, I say the water is home on the spot—that is, within 30 fms. of the shaft, or rather the pits. The surface is covered with granite boulders, but the junction of granite and killas has, or is thought to have, taken place between where the lode is opened on the river and the work north, or the old peepit mine lode shows it runs north of east and south of west, and will cross this lode between where it is opened on and the river; and the junction of granite and killas also takes place there. Then, what has produced this extraordinary gossan? I cannot see; as the junction of granite and killas and the other lode, appears to be west of the gossan. The lode has been opened on in three places east, I should say, from a single glance, 150 fathoms, and the gossan still continuing east. Not a pit has been opened west; this, I say, is something extraordinary for the length of outcrop of gossan. Had it been seen in one place only I should have said it was skirted by a cross lode, but it appears of too great a length to be produced by one cross lode. Let it be produced by what it may there it is, and everything is there that can be wished for—but the ore. If a man had the power of making a lode it could not be better, with its appearance, situation, dip, water-power, and a railway within a mile; he could not have placed in the earth a prettier lode, nor in a better position.

Then comes the grand point—*What produces Gossan?* and is it a sure indication of ore below? I will not ask what ore, as five or six ores produce a gossan. I leave that for some keen eyes and thinking minds to discover the sort of gossan each ore produces. Then, I may go a little further, and ask our best Practicals where they ever saw a lode running (say) 6° south of east, with such a mass of gossan as is there in sight, and no sign of any end that has not produced a mass of some kind of ore under? I am now speaking of lodes and gossans in Devon and Cornwall, and will not battle here with Welshmen and what they call gossan; nor the Californian Yankees on their lime-formation gossan—neither should be called gossans. I was informed that only one mine agent had visited this mine, and he was a man of standing from Redruth, and he said *he should condemn the lodes, because there had never been a dividend-paying mine in that district.* Well, I would not meddle with nor criticise any man's opinion on these points, if he advanced anything like sound argument, but this is really too bad.

I will close here for this week, and take up his arguments in my next, and see whether I cannot bore a hole sufficiently large to shoot and explode it. I think I shall want none of those extra strong powders to do this, our old powder is quite strong enough. St. Teath, Aug. 29. N. ENNOR.

THE METALS AND THEIR ORES—SILVER—No. XX.

Sir,—I purpose pointing out in the present paper a few of the localities from whence the ancients derived some portion of the large quantities of silver of which they were the possessors. As the East was the fountain head of all human learning, it is not surprising that we have positive proof of the earliest mines existing in Asia. According to Pliny, the Silians had the richest silver mines of all India, and the same historian refers to two islands—Chryse and Argyre—near the mouth of the Indus, in which rich silver mines existed. The silver mines of Persia, Tartary, Siberia, and other parts of Eastern Asia contributed largely towards the vast levies of precious metal annually made by Darius. The remains of some of these ancient Siberian mines, together with the crude furnaces in which the ore was smelted, now overgrown with forest trees, are still extant, and tools probably used by the nomad Scythians, made out of bears' tusks, stones, or copper, are occasionally found.

The Pharaohs derived most of their silver from the mines of Nubia and Ethiopia, and the Persians and Phoenicians likewise obtained large quantities of silver as well as gold from the latter countries and from Egypt. We have it from Diodorus that these mines were worked by slaves and criminals, fettered and closely guarded by overseers, who lashed them severely, allowing them no clothing, paying no regard to their lameness, sickness, or weariness, but compelling them by blows from cudgels to work day and night, until death relieved them from their sufferings. Their tools were sharpened flints and hardened copper chisels, the aid of fire being employed in fracturing the rock. The veins were mostly reached by adit levels along which the ore was carried in sacks, illumination being obtained by burning splinters of wood, or oil contained in rude lamps made of clay. They crushed their ore in stone mills, and smelted it in earthen pots placed in furnaces, refining the silver with lead, tin, salt, and barley-bran; originally Egyptian silver was the purest known, but they soon learnt to adulterate it with "brass of Cyprus." It may be a satisfaction to some people to know that the art of adulteration does not, therefore, exclusively belong to modern times. Theophrastus gives quite a technical description of an ancient Egyptian mine: he says, "The vein of earth they dig runs lengthwise, and is only of the depth of 2 feet, though considerably more in breadth, and it is enclosed on every side with hard stones from which the ore is drawn forth." Another historian says, "In the body of the earth there are many veins shining with white marble (quartz or calc spar?) and glittering with all sorts of bright metals."

The Phoenicians and other eastern emigrants were the first to introduce mining into Europe. The Greeks through them became expert miners; and Thrace, Attica, Epirus, the islands of Cyprus, Siphnos, and Thasos were famous for their silver and other mines. The Romans also acquired the art, which subsequently extended itself to the barbarians inhabiting the larger portion of Europe. The Phoenicians visited and colonised Spain, and few countries seem to have been more productive in silver in remote times than this. So plentiful was the metal that the agricultural and other implements of the inhabitants were made of it. King Solomon sent expeditions there, and Isaiah, who lived 600 years before Christ, speaks of the silver brought by the ships of Tarshish, conjectured to be Spain. It is recorded by Diodorus that the dense forests with which the Pyrenees were covered were on one occasion set on fire by lightning, the minerals were fused by the intense heat, and pure molten silver ran down into the valleys like water. The ignorant barbarians then inhabiting Spain, not knowing its value, gave it to the Phoenician traders in exchange for cheap trinkets (the "Brummagem" ware of those days), and we read that the merchants not only loaded their ships to the water's edge with the treasure, but that they threw their leaden anchors and other utensils overboard, and had them replaced with silver ones.

Rich silver mines were anciently worked in Andalusia and Murcia, especially in the provinces of Cordova, Grenada, Jaen, and Murcia. Hannibal obtained silver at the rate of 300 lbs. per day from the

Bebulo Mine, near Guadalcanal, and the pits of Hannibal are still in existence. EDWARD GLEDHILL, Mining Offices, Shrewsbury, August 27.

DIAMOND DISCOVERIES IN THE ROCKY MOUNTAINS.

Sir,—The remarks in the *Times*, with reference to the rumoured discoveries of diamonds in the Rocky Mountains, has reminded me of a conversation I had with Governor Gilpin, of Colorado, when at Denver, at the beginning of this year. Governor Gilpin has for years been one of the most enthusiastic scientific and searching explorers of the mineral recesses and wonders of the Rocky Mountains. Twenty years ago, when he pointed out the route for and practicability of the Pacific Railroad, and described the vast metalliferous riches lying dormant in these mountains, he was looked upon as a madman. Now, where in the latitude and longitude of Colorado, these words pointed out—"Here is the country of the bright stones of the Indian Ocean." I asked if he had ever been in a district that appeared to him to be diamondiferous. He told me that he had been in such a country, but was driven out of it by the Indians; it is called the San Juan country, and is situated in the extreme south-west of Colorado, on the borders of Arizona and New Mexico; the prevailing rock of the country is itacolumite—a dense sandstone—which prevails also in India, Brazil, and other countries where diamonds are found, and is supposed by mineralogists to be the matrix of diamonds. A specimen of the diamond in this rock (stated to be its supposed matrix) is to be seen in the Museum in Jermyn-street.

That diamonds exist in the Rocky Mountains I have no doubt, but whether their whereabouts has been discovered by the prospectors of Messrs. Roberts and Harpending has yet to be proved. Bartholomew House, London, Aug. 29. WILLIAM COPE.

THE DIAMOND WONDER-LAND, ARIZONA.

Sir,—The once Golden City of San Francisco has now, by the grace of the notorious speculators George D. Roberts and A. Harpending, become the Diamond Queen City of the Pacific. A company, with a capital stock of \$10,000,000, has just been organised to work an immense gravel ground in Arizona, where diamonds, rubies, sapphires, emeralds, &c., are being found and sent to San Francisco, to be sold there by the bushel as common peanuts. Harpending, Roberts, and their engineer, Janin, are at the head of the scheme, and these unsuccessful promoters on the London market of the famous Lincoln Mine and the Pyramidal Mountain Gold and Silver Mining Company, some years ago, have turned diamond operators. I hope the diamond fever now raging here will not be allowed to infect the English market. Sensible people have not the least confidence in the scheme.

As an instance of the extraordinary excitement that has been produced by the "discovery," and the way in which it is worked up by the newspapers, I forward you a cutting from the *Schell Creek Prospect*, and I trust you will publish it in the *Mining Journal*, as not only conveying all the procurable information on the subject, but as a specimen of our lively style of reporting. CORRESPONDENT, San Francisco, Aug. 3.

THE DIAMOND WONDER.

WHAT PEOPLE THINK AND SAY ABOUT IT.

\$600,000 worth of stock sold in twenty-four hours.

A WET BLANKET ON THE FIRE.

An experienced lapidary says the value of the jewels has been greatly over-estimated.

MR. ROBERTS DISCLOSES THE LOCALITY OF THE DIGGINGS.

A shrewd broker shrugs his shoulders and says he doesn't want any stock.

The excitement over the great discovery of diamonds and other precious stones in Arizona, which was made public a year or two ago, after having been kept a secret among the lucky ones for nearly two years, has already become intense, and is hourly increasing. The strike yesterday formed the theme of many excited conversations and discussions, alike on the street corners, behind the counters, and in offices. Men meeting upon the street exchanged the customary salutations, and in the same breath enquired about the new and wonderful strike. The brokers gathered on the street corner, as usual, gave up for the time being their "bulling" and "bearing," to discuss the probable extent of the strike. On California street scarcely anything else was talked of. The great diamond discovery was in every mouth, and parties were rushing excitedly hither and thither in search of the stock, of which a limited quantity was put upon the market.

THE CENTRE OF ATTRACTION.

Yesterday was the office of William Willis, secretary of the company, at No. 17, Hayward's-building. The stones which have already been obtained in the new goldcraze are kept in his office every day from 10 to 3 o'clock, after which they are transported to the safe of the Bank of California for safe keeping. As soon as it became known that the stones could be seen at Mr. Willis's show-case the excited people began to pour in, and catching a glimpse of the pile of veritable diamonds, rubies, and sapphires, they departed more excited than ever, and determined to secure some of the stock if possible at almost any price. All day long a continuous stream of anxious and excited people thronged the office and the passage leading to it. The crowd around the show-case which contained the stones was so great that it was with difficulty one could obtain a glimpse of the precious brilliants. Many enthusiastic expressions were heard, and the excitement is so high that probably not a few in the first flush of excitement will start out in search of the new fields.

SALES OF THE STOCK.

On Wednesday evening 15,000 shares of the stock were only offered in the market, at the rate of 40 per share. So great was the excitement that in less than 24 hours every share was subscribed for, and people were crying for more, but it was previously agreed between the owners that this amount was to be all that should be put upon the market and sold. Among those who have invested rumour tales Eugene McCarthy down for \$10,000. It is stated that the stock that is being sold belongs to Messrs. Harpending and Roberts, and that Mr. Lent has declined to sell a share of his stock.

PER CONTRA.

But while many are going frantic with excitement there are not a few cooler heads who have in their minds the memory of several other first-class sensations, or immense excitements, over reported strikes of a similar character in different parts of the country, which have proved to be chimeras of the first water. They recall the excitement over the Gold Bluff diamond fields, which created such a furore a few years since, and other fevers which have excited the people of this coast, and only to lead them to bitter disappointment and financial ruin; and on the principle that "a burnt bairn dreads the fire" they hold aloof from the excitement which is drawing so many into its vortex.

ADDITIONAL PARTICULARS.

The fortunate discoverers and owners of these new diamond fields are, it must be confessed, good at keeping a secret. With the exception of the few facts which accidentally leaked out in the early part of the week, they are reticent, and as close as a beer barrel over their secret. In the hope of obtaining additional particulars to lay before our readers in regard to this absorbing subject a *Chronicle* reporter took a cruise on California street yesterday afternoon. He first went to the office of Mr. Willis, the secretary of the new company. In answer to an enquiry of the reporter he said that the office had been crowded all day by people anxious to see the stones, and he was certain there must have been more than a thousand people in there during the day for that purpose. Finding him in good humour, as was quite proper and reasonable to expect of the secretary of a company with such flattering prospects, and as he appeared quite communicative, the reporter, to try him, enquired as to the locality of the new discovery.

THE BLISSFUL IGNORANCE OF THE SECRETARY.

The smile instantly faded from the placid features, and turning to his companion Mr. Willis remarked: "It is no use to ask me about the locality. I actually don't know any more about where it is than you do. All I know is that a company has been formed, and they say that the discovery was made somewhere down South. That's all I know about it."

The gentleman who was in the office with Mr. Willis, but who was unknown to the reporter, here broke in with the information that "the stock was offered in the board to-day for 60, seller 90." Finding he could get no more information in that quarter, the reporter departed in search of better diggings.

MR. ROBERTS DISCLOSES THE LOCALITY.

He next wended his way to the office of George D. Roberts, No. 403, California-street. Mr. Roberts was in his office, and greeted the reporter with his usual urban smile, and the following conversation ensued:—

Reporter:—Is there anything new to-day in regard to your little diamond matter, Mr. Roberts?—Mr. Roberts:—Nothing new.

Reporter:—Have you no further statement to make in regard to the matter? People are considerably excited over it, and are anxious to know more of the particulars, and if you think it proper to give any more particulars I should be delighted to lay them before the public through the columns of the *Chronicle*.

Mr. Roberts:—No, there is nothing more that I feel inclined to state just yet. You may say this, however. People are anxious to know the locality, and I suppose I have been asked where it is a thousand times to-day. Now, as people are so anxious, I think it will gratify them and let them know just where the stones are found (smiling). You can state, then, that they grow up here in the tules. That's all; of course we are not going to reveal the locality yet.

Reporter:—You say, "Not yet," and I suppose from that that you intend to let the public know about it some time. How soon may we expect a statement from you of the full particulars?

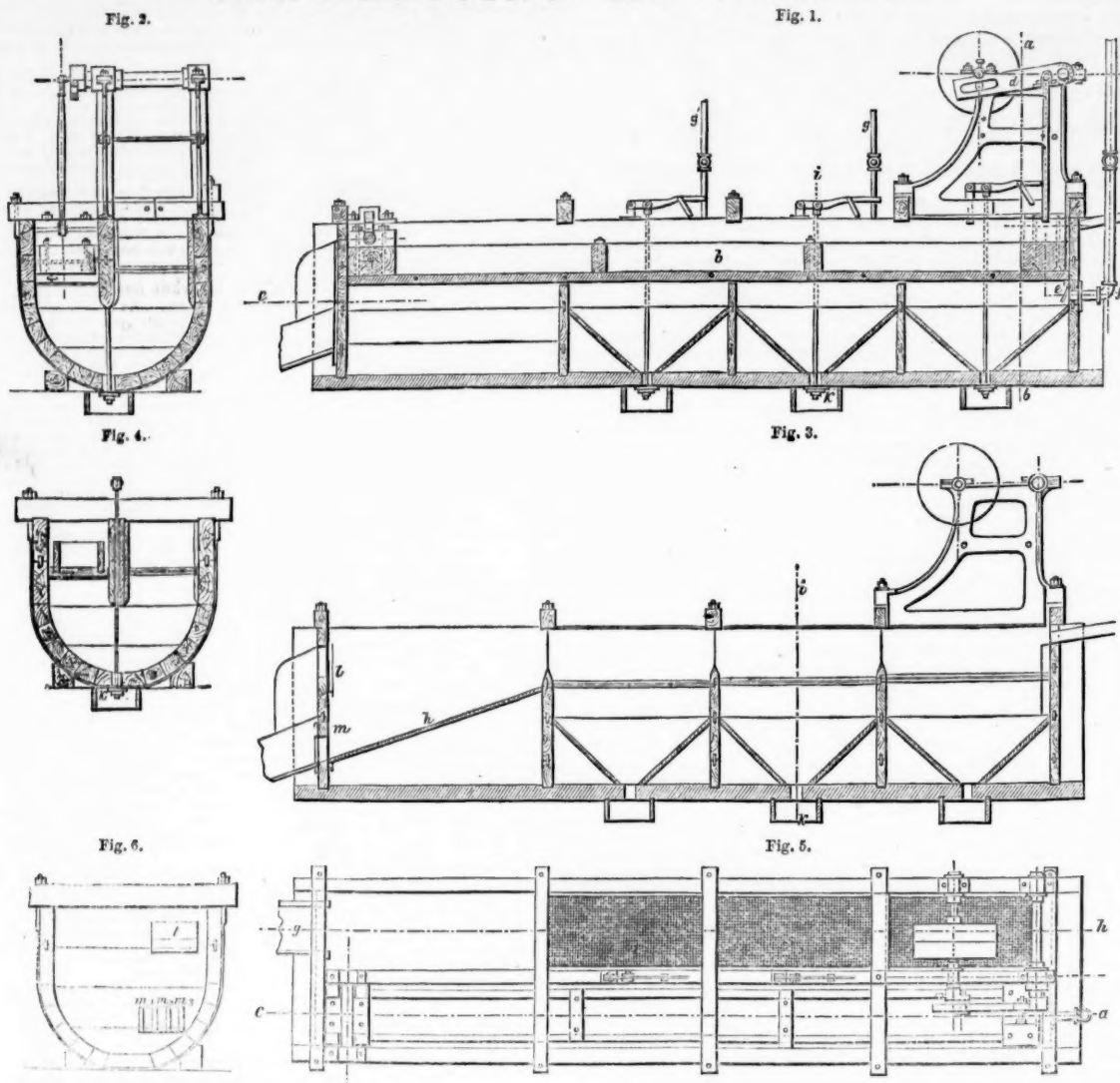
Mr. Roberts:—Oh! in a few weeks we will let you know about it. Of course, we do not expect to keep it a secret always.

A LITTLE MORE LIGHT.

The reporter next called upon another one of the owners and original locators, who occupies a prominent position in the new company, but who desired us not to give his name in connection with the matter, as he had an aversion to appearing in print. From him the reporter obtained the following additional information:—They have a force of 25 men at work on the ground, and are rapidly developing their mine. They are going to lay out a town close by, and have surveyors at work for that purpose now. The manner in which they purpose working the ground is to dig down to the bed rock, which is only about 3 feet below the surface, and to wash the soil in rockers. After washing it they throw out all the large stones, carefully

RICHMOND CONSOLIDATED SILVER MINING COMPANY.
 R.—I have what I consider a just cause of complaint against the directors of this company. According to what has appeared from time to time in your weekly Stock Exchange article, it would seem that telegrams are received giving the result of the mining week's operations; and, from what you have published, the results may be considered highly satisfactory. The more especially when you have informed us up to the present time only one furnace has been at work.
 My complaint is that Mr. Corrigan, one of our board, after a thorough inspection of our two mines, has not thought fit for some reason or other to submit his report to the shareholders. Why is this? Why has not the general meeting been convened? Why do not the directors follow the example of other respectable companies, and keep the shareholders fully informed of the position and prospects of their property? For whose especial behoof are the weekly telegrams received? Do we receive the company's funds pay for them, and, therefore, the shareholders are just as right to be made acquainted with the information they contain.
 At the statutory meeting we were congratulated upon possessing a property so

ORE-DRESSING MACHINERY.



ORE-DRESSING MACHINERY—No. XX.

CAZIN'S FINE SAND JIGGER.—The novelty in this apparatus consists of a single oscillating piston applied to three distinct sieves, and of discharge holes (m^1, m^2, m^3) for taking off the impoverished sands, the holes being a short distance above the bottom of the hutch. Fig. 1, longitudinal section through the centre of the piston, showing axis of piston, piston-rod, differential gear, main and subsidiary water-pipes, Fig. 2, transverse section on line a, b . Fig. 3, section through sieves and discharging plane. Fig. 4, transverse section through sieve and piston. Fig. 5, plan of driving-gear, piston, sieves, discharging plane, and outlet launder. Fig. 6, end elevation of jigging-hutch. The particulars of the apparatus are:—Copper wire sieves, each 15 in. wide, 2 ft. 9 in. long; (b) piston hung at c , width 12 in., length 12 ft. 9 in.; (d) differential driving gear; (e) piston-rod; (f) pipe, 1½ in. diameter, for delivering water underneath the piston; (g) foot-valve attached to delivery-pipe; (g, g') small water-pipes; (h, h', h'') valves for discharging stuff passed through sieves; (h) incline for

cond in value to none in Nevada, not even excepting our wealthy neighbour the Eureka Consolidated, but from that time to the present we have been kept in utter darkness. The shares go up and the shares go down, but the shareholders literally know nothing of the causes influencing the market value. The directors are men of standing and position, and above reproach in point of commercial virtue, but they are sadly neglectful of their constituents' interest, in so far as they withhold information, which is clearly as much the property of the shareholders as it is of the board.—Aug. 27.

A SHAREHOLDER.

EBERHARDT, UTAH, AND SOUTH AURORA MINES.

Sir,—In the Supplement of the Journal of Feb. 17 you inserted a letter from me, signed "A Believer in White Pine Pockets," concerning the above companies, wherein I expressed my opinion that "with a proper allowance of time to get over the stormy weather, then prevalent, and as depth would be attained, the shareholders of the above companies would have no cause to complain of the value of their properties."

I think then that as far as the two first are concerned the shareholders have no reason to complain of the real intrinsic value of their properties, for those who have steadily watched the various reports cannot fail to observe that as depth is attained so do the mines reveal their treasures. But what, Sir, I cannot now understand is that on Feb. 16 last, when everything respecting Eberhardt looked most gloomy, our shares stood at from 6 to 7, and now, when Eberhardt looked never so bright, they should only have a market value of from 7 to 8 per share. Who is pulling the wires?

Again, in February last, when the Utah furnaces were not running, with incompetent management at the mines, and with little or no ore on hand, our shares stood at 4½. Now that the furnace is "running constantly," and as Mr. Murphy says, "he is positive of ultimate success," our shares stand only at 3½ per share. Who is here pulling the wires?

As to South Aurora, we must wait patiently for the disclosures of the diamond drill. But what I wish particularly to call your attention to is that part of my former letter wherein I said, "If we could only get good, competent management our shares ought to stand at a premium instead of at a loss." The conversion of stamps from wet to dry has cost us a lot of money, and who knows how soon it may be deemed necessary to re-convert them from dry to wet stamps? The necessity of a new wire-rope so soon after the first had been bought seems a penny-wise and pound-foolish affair. So that if we are to extract the riches from the bowels of the Eberhardt Mines, which evidently they possess, simply to fritter them away in unnecessary expenses, the sooner the shareholders express their dissent the better.

The Eberhardt directors have now had money enough to make our mines and machinery of the most permanent character, and as all reports from White Pine (official as well as private) agree that the Eberhardt Mining Company's property never looked so well as it now does, it is to be hoped that at the next meeting our worthy Chairman will be enabled not only to declare a dividend, but to assure us of an increased continuance of same. Whether he will or not, I still remain—Aug. 27.

A BELIEVER IN WHITE PINE POCKETS.

THE ALMADA AND TIRITO MINING COMPANY.

Sir,—There is nothing like ventilation to a good concern; but that is evidently neither understood nor appreciated by the bulk of the shareholders of the Almada and Tirito Company, and, therefore, having given some attention to the improved condition of the company, I may, perhaps, be permitted to say a few words on the present and evident future of the company, taking the foundation of that which I have to say from the Chairman's letter in the *Mining Journal* of Aug. 7. From that, and a subsequent letter which appeared from an "Original Shareholder," it would seem that the company have about (except that which is already sold) no less a sum than £1100,000 worth of ore available for dividend. This large amount of ore has been shipped since the month of May, and, as the steamers sail twice a month for England, instead of once a month, as heretofore, it is fair to presume that the bulk of these rich ores will come for the future by this route, and, therefore, considerably quicker than by sailing vessels round Cape Horn.

Now, previously to the month of May inclusive, I have taken the following net profits, as published by the company, from time to time, from the commencement of the year—Jan. 62½, 3s. 6d.; Feb. 1200, 16s. 6d.; March 1263, 12s. 6d.; April 1260, 6s. 9d.; May 1694, total, 6040, 0s. 1d. In addition, I observe that the profit for the month of June amounts to 1411, 4s. But, as half this month is taken up with the usual holidays, and the people not working, it is fair to come to the conclusion that the profits would otherwise have been 2600. For the month, with the improved ley and yield of ore from the greater development of the mines, and, as the Chairman has stated, the abundance seems to rain for many years to come. I must confess, therefore, that considering the shares were last year as high as 17s. 6d., when the mine was not one quarter so good or so assured as at present, it is in-

passing water and sand through holes; (m^1, m^2, m^3) in end of hutch; (l) slide for regulating height of water within the hutch. The bridges dividing the sieves rise 3 in. above the sieve bottom. Under side of piston, from top of hutch 13 in.; depth of hutch, 2 ft. 9 in.; thickness of side timber in hutch, 3 in.; of ends, 2 in.; inside width of hutch at top, 2 ft. 9 in.; length, 12 ft. 9 in.; length of discharge chamber beyond the third sieve, 3 ft. 10 in.; thickness of wood in bottom of piston, 2 in.; depth of side planks on piston, 8 in.; area of piston, 123 square feet; aggregate area of sieves, 103 square feet. By means of the differential gear the stroke can be instantly lengthened or shortened, the downward movement of the piston is also rendered more rapid than the upward one, an advantage in jigging large-grain stuff. For jigging stuff 2 millimetres in size the length of stroke on piston-rod is about 1 in.; number per minute, 140; for jigging grains ¼ in. diameter, the length of stroke is 2 in., or thereabouts, number 120 per minute. The illustration is taken from the *Berg und Hüttenmännische Zeitung*. The results from this apparatus are said to be satisfactory.

JOHN DARLINGTON.

2, Coleman-street-buildings, London.

comprehensible that they should be so much below this price, and I, therefore, agree with an "Original Shareholder" in thinking they are worth considerably more than even 30s. per share, inasmuch as I understand all difficulties as regards insufficiency of water for dressing purposes have been overcome—the strikes for labour having subsided, without increase of pay, and the country free from disturbance or revolution, besides the duties being themselves relaxed in favour of shipping silver to Europe. Unfortunately, I hold myself so many shares at a considerable premium that I am thus precluded from purchasing at this uncalculated and unnecessary depression, but I have no hesitation in saying that Almada and Tirito shares would be, with the explanation given by the Chairman and others in the Journal, a most advantageous and desirable investment to any persons placing their money in securities of this kind, for evidently the income of the company is as yet in its infancy.

I find, on enquiry that the 29 tons of ore, shipped on July 26, as advised in the daily papers, and your Journal, includes 18 tons in the Chairman's of Aug. 7, so that an "Original Shareholder" was wrong in his statement to the extent of 11 tons.

GENERAL BRAZILIAN GOLD MINING COMPANY.

Sir,—I have perused with much interest and satisfaction the report of the meeting of shareholders as they appeared in your Journal of last week. The shareholders in this company merit our unqualified congratulations for having come forward and set a commendable example by taking the government of their affairs into their own hands. The facts disclosed show most clearly that the lethargy of shareholders in enquiring into how and by whom the enterprises into which they have invested capital are conducted brings about a lamentable haplessness.

This company is but a fair sample of the whole—an inexperienced official is sent out to Brazil to report upon mines, although probably he never even saw a mine before in his life; and, judging by results, it is not considered at all necessary by the board who thus employ him that he should be qualified by previous experience to appreciate the merits of the agents. In his wisdom, however, he effects radical alterations in the respective managements, with what results we all know too well. The equivocal manner in which the questions were answered concerning Capt. Treloar's retirement from the company can leave no doubt what- ever in the minds of shareholders that there is something kept behind, and something which in common justice the shareholders are entitled to know—and if we are unable to discover it by any other means we are bound to call upon Captain Treloar for an explanation. Why were we not specially consulted upon this most vital point? The same thing occurred in St. John del Rey. When Capt. Treloar, after a series of 17 years, retired from his position the shareholders were never told the reason, although during that long service the mine under his immediate practical supervision had been brought into an effective working condition. Had the shareholders been consulted at the time, and the whole of the facts enquired into, the probability is that Capt. Treloar's services would have been retained, thus averting the dire calamity which has brought this fine property into its present sad condition.

Shareholders should ever recollect that mines are (or should be) managed not by boards of directors in London, but at the mines; and that, therefore, it behoves all interested in their success to have at the practical head of affairs not only a thoroughly practical, but one of the strictest probity and rectitude.

It is daily becoming too evident that, as shareholders in Brazilian mines, we have lost our money by home management—expensive directors, costly offices, and undue interference with practical officials have beyond doubt done more injury and incurred greater loss than anything else, and then when the obvious result becomes imminent managers are changed, whereas the whole cause of the evil is at home—it is, in other words, beginning at the wrong end, and no other result than that now being realised in all the Brazilian mines can possibly be expected until the shareholders themselves are more vigilant in the administration of their own affairs, and judge for themselves of the practical value and qualifications of the manager, upon whom in all cases everything depends.—Aug. 27.

A SHAREHOLDER IN BRAZILIAN MINES.

GENERAL BRAZILIAN MINING COMPANY.

Sir,—I cannot understand what Mr. Kitto means by more actual mining being done, when in reality the monthly drivings are less than they were before he took the management, and also what Mr. Dawson meant by stating in his letter of June 29, and at the meeting on the 20th inst., that there was unnecessary expenditure attached to the driving of the adits. I beg to state that the same number of hands are employed in driving the Itabira adit now that there were before Mr. Dawson's and Mr. Kitto's arrival at Itabira—two Englishmen in each core, three cores per diem, and six blacks in each core, three cores per diem. It should be understood

the extra number to make the 25, stated by Mr. Dawson at the meeting, were those as they are now, employed in filling, driving horses, and landing the debris from the adit, and the three Englishmen removed from the three cores on June 29 were put back to their places on the 19th, because the men could not make headway and what is more strange how Mr. Dawson could have forgotten it, he being a mining properties, as well as those who supersede others, think they must of necessity find fault, run down, and say all the shareholders may not say of them this case. It would be much better for mining and the public in general if investors and gators and those who supersede others would speak of people and places as they find them.

FROM ONE WHO KNOWS WHAT IS DOING AT THE MINES.

GENERAL BRAZILIAN GOLD MINING COMPANY.

Sir,—It was not my good fortune to be present at the meeting of the General Brazilian Mining Company last week, but having read the report in the *Journal*, I am rather surprised that in dealing with the reckless expenditure hitherto lavished attention was not bestowed upon one very important item in their general expenses in England. I allude, of course, to the directors' fees, managing directors' salaries: 1881, 16s. 8d. is a very large amount, and some explanation is due to the shareholders about that, bearing in mind that there are four companies carried on under one roof, with the same chairman and managing director, and as far as I can make out, the directors are almost identical. At present I refrain from saying more than that I believe, and should hope, that there are gentlemen of position in this city who would, as directors, carry out an undertaking as the General Brazilian Mining Company at a much less expense than 1700, per annum. I think even this sum exceeds that actually paid to them from this one company, 107, 8s. 1d. for stationery and printing, and 145, 11s. 1d. for postage, &c., seem to me very large items in the office expenses of a single company; but they are nothing compared to the amount for directors' fees, &c.

Another point that struck me on reading your report was the animus on the part of Capt. Treloar and other shareholders towards Mr. Haymen and Mr. Dawson, and the refusal of Capt. Treloar to work under these gentlemen. What does this mean? Then, again, about mining. I am rather surprised to hear Mr. Treloar's experience set at naught by Mr. Dawson, because from all I can gather the latter was gaining practical knowledge when both Messrs. Dawson and Haymen were engaged on the London and North-Western Railway.

OBSERVER.

NORTH AMERICA GOLD MINING COMPANY.

Sir,—Perhaps the directors will inform us, through the Journal, how they have been managing the above-named company, and with what results, since they assumed the control of it in Dec. 1871. They told us in the prospectus that the mine was then making large profits, that there would be immediate returns, and we had the positive assurance of Mr. Morgan (the present manager), confirmed by Dr. De Groot, that if properly worked the mine would yield a profit of 65,000, a year. Mr. MacLean, the manager of the Sweetland Creek Gold Mine, also made a special and very favourable report on the North America, and with such an array of testimony as to its great merits it was but natural to conclude that we had got a sound and valuable property for the comparatively small sum of 80,000. But it would now appear that this is by no means the case, for no dividend has yet been paid, nor have the directors, during these eight months of their management, given us any information as to the state of our property and its prospects; while it has been positively stated in at least two well-known respectable Journals that the mine was bought for about one-fourth of the sum for which it was sold to the public, and that it is only fit to be classed with Mineral Hill, and other concerns of that stamp. Then we were promised a quotation on the Stock Exchange, but this promise, like all the others relating to the North America, is still unfulfilled, and the directors have not told us the reason, nor have they again alluded to the subject.

Such unusual reticence on the part of our directors naturally excites distrust, and a strong suspicion that there is something rotten in the state of the mine; moreover, it is unjustifiable and unfair to every—

SHAREHOLDER IN NORTH AMERICA.

CORNISH INSPECTORS, AND AMERICAN MINES.

Sir,—I have been busily employed travelling through the mining regions of Nevada, Utah, and Mexico for the past six months, and have often in my travels seen the most costly quartz machinery and fine buildings going to ruin in out of the way localities, where my countrymen had been losing some of their superfluous cash on supposed quartz veins. Several English speculators are seeking information about various mines on this coast, which were either held in London or were offered for sale there, and I could tell them that a great many mines have been sold in England at very high figures within the last two or three years, which are entirely worthless, although many of them were approved of by Cornish mining engineers, who were sent out from home to examine and report. By-the-by, none of these men when they see a silver mine have the remotest idea whether it is good or bad. Take them away from tin, copper, or lead and they are lost. One of the best of that class whom I ever met, who was sent up to Idaho by the Lucy Phillips Company of London, gravely assured me, when standing in the tunnel of the Lucy Phillips Mine, that five men could keep a 40-stamp mill running on high-grade ore, at the same time there was not a pound of silver ore within two miles of us, but I was a little diffident about telling that to a man who had been a mining captain in Cornwall for 50 years.

Mining property offered on the London market should be examined and reported upon by local inspectors, who would ascertain the title to the ground, its distance from the railroad, &c. How do the stockholders like their Maryland mine in Pinto district, or their last purchase in Troy district? Is it known whether the Zacatecas Mine has been sold? The General Lee Mine, about which I wrote to you six months since, is on this market now, and paying very well. Mismanagement has cost the Richmond Company of Eureka \$100,000, and I gave those gentlemen timely notice that that portion of their ground was subject to location.

San Francisco, Aug. 1.

[For remainder of Original Correspondence see to-day's Journal.]

INVESTMENTS BY TRUSTEES.

Much doubt is often felt by trustees as to the mode in which they may invest the property left to their care. There is no doubt a trustee has, first, to follow the directions contained by the will or deed appointing him. Next, observes the contemporary to whom we are indebted for what follows, he must observe certain rules. First, even if authorised to invest in mortgage of real estate, he must not take a mortgage from himself, nor must he take a mortgage from anyone without a deed, investigation into his title. Secondly, he must not invest in any security, although within his catalogue, which is open to any obvious objection. Thus, if it is notorious that a company incorporated by Royal Charter is paying dividends out of its capital instead of out of its revenue, the trustee must not invest in its debentures, although such debentures are within his catalogue. Thirdly, where "A" is to have the income of the trust fund for life, and after his death the fund is to go to "B," the trustee must not select such investments, even though within his catalogue, as will benefit "A" at the expense of "B," or vice versa.

If a trustee is expressly authorised so to do by the instrument creating the trust he may lend the trust funds on personal security; but of course, not otherwise. A general authority to lend on personal security is very unusual, but it is not uncommon in a marriage settlement for the trustees to be authorised to lend a portion of the trust funds to the husband on his personal security. This brings us to a difficulty which a trustee often has to contend with. He is pressed by some of the parties for whom he is trustee to commit a breach of trust, either by lending the trust funds on personal security when not authorised so to do, or by investing the trust funds in securities which are not authorised, for the purpose of increasing the income. If he refuses he offends his friends, and if he consents he runs the risk of being called upon by persons interested in the trust funds, but not parties to the transaction, to replace the trust funds in the event of their being lost. Not only can he not be compelled to consent, but there is no doubt that he ought to refuse, except in one or two cases—first, where all the parties who are, or under any possibility can be, interested in the trust funds are parties to the transaction; secondly, where, although they are not all parties, yet the trustee is protected against claims from those who are not by a sufficient indemnity from those who are.

There remains to be considered this question—In what securities is a trustee justified in investing in the absence of any directions as to investments? Up to a comparatively recent period he could only invest in the funds. Up to the Act of several Acts of Parliament, however, he is given a wider scope. These Acts are as follows:—22 and 23 Vict., c. 35, s. 32 authorises the investment of trust funds in the Bank of England, or Ireland, or East India Stock (unless expressly forbidden by the instrument creating the trust); by 23 and 24 Vict., c. 38, s. 10, trustees having power to invest in Government securities are authorised to invest in any of the stocks, funds, or securities in which, by general order, cash may be invested by the Court of Chancery. By a general order in pursuance of this Act, cash may be invested by the Court in the following securities:—Bank of England Stock, Exchequer Bills, and 2½, 3, and 4 per Cent. Annuities, mortgage of freehold land, and copyhold estates in England and Wales, Consolidated 3 per Cent. Annuities, and reduced 5 per Cent. Annuities, and New 3½ per Cent. Annuities. Then 30 and 31 Vict., c. 139, s. 2, authorises trustees (unless expressly forbidden to do so) to invest in the securities the interest of which may be guaranteed by Parliament. This Act goes on to state that the words "East India Stock," in 22 and 23 Vict., c. 35, shall be construed to include not only East India Stock existing prior to Aug. 18, 1859, but East India Stock created subsequent to that date. It should be observed that a guarantee by Parliament is required by the first quoted portion of this Act, that a guarantee by any Secretary of State, or any Government department, is insufficient to answer the requirements of the Act. Beyond the securities above mentioned by our authority, we may add that section 13 of 34 and 35 Vict., c. 47, mentioned by our authority, empowers a trustee, executor, or other person empowered to invest in public stocks, funds, or other Government securities, to invest, unless forbidden, in Metropolitan Consolidated Stock.—*Christian's Financial Gazette*.

COAL, AND CORNISH MINING.—The Crenver and Wheal Abraham United Mines meeting will be held next week. The directors in their report state—"With reference to the coal question, there are such reasons to hope that this mineral will fall in price before the depth of winter, that the board has not felt warranted in a vast expenditure for the sake of being prepared for a yet greater scarcity. It is probable that new pits, now being opened, will be sending coal to market before long, and new coal fields will be won, as soon as their machinery can be made to meet the present and still increasing demand. New substitutes are being discovered, and improvements, with a view to save fuel, are being made by the inventive engineers. At present prices, the superfluous exports of British coal to the markets of Australia, India, and South America, where noble coal fields already exist, must soon collapse. Belgian coal is already coming here, and Sweden will presently offer her stores, should we require them; and, finally, there is always hope that the disputes between capital and labour may cease from troubling the and all its collateral branches of industry. The chances seem, on the whole, rather in favour of a fall than of a rise; and while the board have arranged with a firm they usually deal with for a continuous weekly supply at current rates, they have made contracts to a very small extent for a reserve."

[FROM NOTES BY OUR OWN REPORTER.]

The chief feat of the lifting pumps used in very deep mines is that a main-rope passes down the shaft, and to it are attached a series of pumps at intervals, called *cats*, each of which is connected with a cistern. Thus, the bottom set raises and carries the water into the cistern above, and then the second set raises it another step, until it reaches the adit, by which the water is passed away. Machinery of this kind is very effective, and although for distances more than 1,000 ft. the derise of plunger-pumps is gradually superseding the lift or drawing pump, it will doubtless long maintain an important position in the work of draining mines. If we turn to the pages of *Agriologia* we shall find that a great deal of ingenuity was expended upon the pumps in Italy. An Italian, named Romelli, filled a book with different arrangements for lifting-pumps, but his plan differed very considerably from those of the Cornish pumps, and showed a more ignorant and a greater degree of exaggerating indefinitely the number of all the moving parts—a point of great weakness—which told against its adoption until great improvements were introduced in the Cornish mines at the latter part of the last century. If you refer to the work of Delius you will see that the reason they adhered so long to what was called the low lift, the sets of which were only 4 feet in length, was that they had the idea that the lift must be restricted to the height water is raised by atmospheric pressure—about 32 ft. But the Cornish pumps are not of this kind. At the top of a common bucket or lift of the pump you have a series of pipes the water may be carried much higher, and the lifts gradually increased to 8 or 10 fms., and even occasionally to 16 fms. It was found, however, in practice that wooden pumps would not bear the pressure, and the system could only be satisfactorily introduced where the cast-iron had replaced the wood of the earlier lifts. The lower portions, however, of the Cornish pumping-engines are made of wood; and, as the simplest form it is very difficult to make any part of this kind. In the bottom of the main drawing-lift there should, beneath the part in which the moving portion works—that is to say, the barrel, called the “working barrel,” and which is now

MINERS' ASSOCIATION OF CORNWALL AND DEVON.

ness was limited to mining operations, so far as Cornwall was concerned, chiefly interesting and valuable in that connection, was the Burleigh rock drill, which had been shown at work every day during the exhibition. Hitherto the efforts made to introduce boring machinery into the county had failed. He believed that would not be the case much longer, for several of the Burleigh drills had been purchased. It would soon be at work in different localities. He should wish to call special attention to the matter of Mr. T. S. Carr's Cornish pump engine, which was so effective and cheap. Though especially designed for coal mines he believed that it would be found very useful in connection with metalliferous mines also. It should be borne in mind that the plan of a coal mine resembled very closely the section of a metal mine; and that the likeness would be even closer if the works of the latter were carried out with more regularity than could be the case in the older mines. The Cornish pump engine, of these kinds, was supplied in connection with Captain Maynard's admirable section, to which he alluded, had the greatest pleasure in directing attention. Capt. Maynard was one of the comparatively few working mine agents who really did original work. There was an exceedingly interesting model of Carr's disintegrator, which was applicable to ores as well as to corn and manures. It was not adapted to their tin ores; but was of great use in the treatment of the ore of zinc, and would be useful also in dealing with some of the other ores. There was also an exceedingly interesting model of the mill, which would repay examination. He would especially direct attention to the exceedingly fine and accurate model of a Cornish pumping-engine, made by the Perran Foundry Company. Among other matters referred to by Mr. Collins in the course of his expository address were Hayward Tylor's pump, Bellows's calculator, Scott's wheel moulding machine, the Little Rapid knitting machine, Shute's hand mifring ditto, and the gas engine, the plough and broadsword, the water saw, the water press, the dynamometer, Purker and Smith's excellent laminated sounding board, and the beautiful inland work of Mr. J. Martin.

FOREIGN MINING AND METALLURGY.

As regards the French iron trade, it may be affirmed that the situation has acquired additional force and strength during the last few days, and that the activity which has so long characterised affairs is at its height. France is, in fact, securing the fruits of the, perhaps, enforced prudence which prevented her from following the exaggerated upward movement in foreign markets. A rise in prices has none the less ensued, but it has proceeded from consumers who had met with rebuffs in Belgium and England; and the state of the French iron trade is accordingly less unnatural and precarious than it otherwise would have been. It is stated that the French Minister of Public Works has insisted upon the French railway companies continuing the works conceded to them, the State for its part being prepared to execute those devolving upon it. The new works thus insisted upon will form an important outlet for French industry, as foreigners at present rates will not be enabled to compete. Orders for iron continue abundant in the Champagne group. Machine iron, mixed quality, has attained a quotation of 16*l.* per ton; rough refining pig, charcoal-made, is quoted at 7*l.* per ton. Prices have only slightly varied; the little change which has occurred has tended towards an advance. Upon the whole, French metallurgists have every reason to be satisfied with the present state of affairs.

INSPECTING CALIFORNIA MINES—A CORRESPONDING LONDON
MINING BUREAU. We are informed by some of the California

"News received from Sonora inform us that Col. BERTON, French Vice-Consul at Sacramento, and President of the Mining Bureau, accompanied by Mr. JOHN WALLACE, as engineer, has commenced his inspection tour by visiting Tuolumne county. The object of this inspection through the mining region of the Tuolumne country before the expiration of the new month, is to obtain reliable information in regard to the progress of our mining interests. It is proposed to appoint in each county a reliable person who will register, free of charge, any valuable mining claims intended for a foreign market. Once registered they will be inscribed on the books of the Corresponding Mining Bureau in London, and thus brought to the notice of European capitalists. Mr. ROCHER, of Sonora, has been appointed to receive registration of mines located in Tuolumne county. A number of the miners met Mr. BERTON at Sonora, and expressed their satisfaction at the meeting, and their willingness to place the Mining Bureau to aid in the development of our mining resources. Mr. BERTON strongly advised the miners to secure as speedily as possible the United States patent for their mines, as foreign capitalists are very reluctant to enter into any negotiation until that document is obtained.

Both Mr. WALLACE and Col. BERTON have been favourably impressed with the successful working of the leading mines of Tuolumne county."

COLORADO MINING ITEMS.

Georgetown, Aug. 1.—Mining has never been so prosperous and promising as at the present time. Our silver-bearing mountains are covered all over with busy and active miners, and all seem to be doing well, as they have plenty of money. Our mines are numerous; we have upwards of 10,000 recorded, and, perhaps, as many more to record. Mines are doing well, and some of them exceeding the largest expectations; and any person who has any doubt on the subject has only to pay us a visit, go into our mines and see our crushing and sampling mills, and look at the sacks of silver ore waiting for transportation to the railroad at Golden City, to be convinced of the reality of our rich mines. You may see 20 and 30 tons piled up on the outside, and as much more on the inside, while the roads and mountains are covered with wagons and pack jacks 20 in a drove, all loaded with silver ore. We have need of all kinds of mechanics, labouring men and women, too. A common labourer gets \$3.50 per day (say, 12s.); mechanics, \$5; miners, \$3.50; washerwomen, \$3.50; servant girls, \$2 per week. When the large English company's smelting works are erected at Golden City, and the C. C. Railway completed to Georgetown, we shall astonish the world with our enormous production of ore. It is to be hoped that these works will soon be commenced, for there is many thousands of tons of ore lying on the dumps of the mines in Clear Creek county alone, awaiting such a market as these works will give, particularly at the Terrible, Snowdrift, Silver Plume, &c.

Central City, Aug. 7.—Bela Buell cleaned up and retorted as the result of last month's work, at the Levitt Mine, 600 ozs. of gold bullion, from 150 cords of ore. The tailings were all saved, and assayed from \$75 to \$100 per ton. Should all the ore run in this way the silver will be worth ten times as much as the gold. The retort has attracted no little curiosity this last few days, having been exhibited at the Rocky Mountain National Bank; it was reduced at a profit in a water-mill, thus giving a practical demonstration of what can be done with our low grade ore, and how it will be one of the most productive resources of our mines when the railroad is completed, and we can get cheap fuel and smelting works that can treat it, and save all the mineral contents.

Golden City, Aug. 7.—Two distinguished Russian mining engineers, Col. Michael Boutin and M. Alexis De Lomassoff, are now visiting here for the purpose of reporting to the Russian Government the condition, value, and economical status of our gold and silver mines. These gentlemen brought letters of introduction to our distinguished townsman, Capt. E. L. Berthoud, who accompanied them upon a tour of the mining regions of Gilpin, Boulder, and Clear Creek, returning to Golden on Monday. They express themselves as greatly pleased and astonished at all they have seen, as quartz mining is entirely new to them, all the gold in Russia being from bar or placer diggings. They will spend some days in examining the resources of Jefferson county, and will make an elaborate report upon our coal, fire-clay, and gypsum, copper, iron, &c., and will watch with interest the operations of the fine smelting works we are to have erected here.

FOREIGN MINES.

EMMA.—Telegram from Salt Lake City, dated 26th inst.: "Forwarded 100 tons first class ore this week to New York; raised 280 tons first class ore this week; raised no second class ore this week; 160 tons first class ore at railway depot; 560 tons first class ore raised at mine; 300 tons of lead inaccessible, mixed up in cave." [The 300 tons sent to the directors to refer to part of the 540 tons which were on the floors of the mine at the time of the inundation, which cannot yet be got at. The usual interim monthly (the 10th) dividend has been declared at the rate of 18 per cent. per annum.]

—Telegram from New York: "100 tons shipped per Algeria; expecting 230 tons."

SWEETLAND CREEK.—G. D. MacLean, July 27: Hoisting machinery complete, with the exception of the minor improvements and the tackle. The shaft is down 75 ft., and within 10 ft. of completion. The driving will probably commence in another week. The new tunnel is now in 1215 ft. I have been levelling for three or four days to determine the exact depth the shaft is required to be, and, after four surveys, find the shaft, when down, will be 76 ft. below the level of the old shaft, and 86 ft. deep from top of shaft. The new tunnel being longer than the old, about 5 ft., has been consumed in grade, still we are deep enough, and my only regrets are that the tunnel is not completed.

COLORADO.—Extract from agent's report for week ending July 27: New Shaft: I am glad to have good news to tell you of this part of the workings. We had let a contract to the shaftmen to start the new drifts east and west of the shaft, and also to widen the shaft at this point to make a loop for the cars to pass from one level to the other across the shaft. The men, in widening the shaft, struck a very large body of ore, measuring in the place where it was first brought to sight 10 to 12 in. fine galena, mixed all through with brittle silver. When it was stripped the length of the shaft it was found to measure from 6 to 12 in. wide, and with all the appearances of widening as it goes down; the drifts also on both sides of the shaft show the vein to both keep its width and fine character. I have at my office three fine specimens, the one weighing 50 lbs., the others less, where the vein measures 7 inches wide, with a vein of brittle silver running through the galena 1½ to 2 in. wide.

ALMADA AND TIRITO (Silver).—The 16 tons of concentrated black ores by West India mail steamer has been sold at 58½ 15s. per ton of 20 cwt. Advances have been received that Messrs. Cross and Co., of San Francisco, have received \$5000 in coin from the mines, which will be immediately sold, and the proceeds forwarded to England. The net profits for June have been telegraphed as 141½ 1s.

SILVER PLUME.—The directors have received, from their agents in Liverpool, the following account of sale of 227 bags of their silver ore: 9 tons 2 cwt. 7 lbs., at 120½ 15s. 3d. per ton—1009½ 6s. 10d. The average assay 47½ 10s. to the English ton. They have also received advice of the arrival of another shipment of 181 bags of silver ore per Wyoming.

MALPASO GOLD WASHING.—The directors have received by West India Mail advice from their superintendent, Mr. Clarke, dated July 19, from which the following is an extract:—"I shall turn the water through my pipe to-morrow, and shall in a day or two more consider myself regularly at work. I shall, I think, without any doubt, be able to remit a nice dividend by next mail, and if I do shall have no difficulty in keeping it up, as the pay will certainly increase, as we shall get more 'pay dirt' and less waste as we advance into the mountain."

RICA GOLD WASHING.—The directors have received from their superintendent, Mr. C. R. Clarke, a special report upon the property, of which the following is a copy:—"On the 11th, 12th, and 13th of this month I visited and examined the Rica Mine. I found it situated in a healthy and very desirable locality, being less than an hour's ride from the town of San Ana, where there is a good market. After examining the ground I have no hesitation in pronouncing it a A 1 mine, and well situated for working by hydraulic. The gravel deposit is immense, and the prospects fine—lying on slate with the bed rock exposed in the outlets, it can be worked to the bottom, and all the gravel washed. The outlets are ample and good, and the mine can be opened quicker and worked cheaper than any mine of the same magnitude that I have yet seen in this country. The water supply is not near as much as it ought to be for such an extensive mine, but still there is sufficient to do the work at a small expense. I shall myself examine thoroughly in regard to water supply ere I write you again. I feel safe in congratulating you on having a good property, well situated, and sure to pay. I will write you more particulars next mail."

UNITED MEXICAN.—Extracts of despatch from Mr. Edward Hay, dated Guanajuato, July 23:—"The general work in the mine of Jesus Maria has been carried on much as in former months. The workings which were unproductive have been timbered, and the extraction of ore has increased to some extent as compared with that of the former months. In Remedios the old workings have not changed. In a cross-cut to the east, now 100 yards long, from where it was opened from the La Luz lode, a new vein has been cut, which dips off eastward, and on it a gallery has been opened on ore of from ½ yard to ¾ yard wide. This small lode, though the average is low, yields some stones of very good ore.—New Concern: The adit has improved in appearance during the month. The ramifications of quartz rock which are being intersected, with water oozing from them, indicate that the work is approaching the main lode."

ANGLO-ARGENTINE.—Extracts from Capt. Joseph Vivian's report for June: All our mining operations have progressed in a satisfactory manner, but surface works have been rather impeded by heavy falls of snow. In consequence of accident to the engine, the stamping was under suspension for some days, but still the produce exceeded that of the month 24 hours. During the month 24 hours worked 25 days, and 878 tons of ore have been treated, which produced 42 cwt. 7 dwt. 5 grs. This produce, though satisfactory, will undoubtedly be exceeded in the ensuing month. The ore treated has been derived from the different sections of north and south mines, same as preceding month. Third twelve barrels of stamping mill will now be pushed on with as fast as possible. The mine continues to look well. I leave here for Buenos Ayres, en route for England, in the course of a few days, therefore this will probably be the last report you will receive from me from this place; but, before I conclude, I beg to convey every statement I have made from time to time respecting these mines, and I firmly believe, when additional reduction machinery is erected and in full operation, that the results will fully substantiate my reports. I shall take with me, for transmission to the directors, one box containing 954 oz. 4 dwt. and 16 grs. melted gold. The reduction officer's report states that the total quantity of ore treated during the first six months of the present year was 2505½ tons, and gold extracted 954 ozs. 4 dwt. 16 grs., giving an average produce of 7 dwt. 14 grs. per ton of ore.

FRONTINO AND BOLIVIA (Gold).—The directors have received advice by the West India mail from their bankers, under date July 12, accompanied by a remittance of 729 ozs. 15 dwt. of gold, the produce of the Bolivia Mines only, for the month of June.

PACIFIC.—H. Pruden, Aug. 5: Our measuring and setting-day, as usual, was on Aug. 1.—Stops in rock of the 400 ft. level—Batters' ledge: No. 1 stop measured 15 fms. 21 ft., and is re-let at \$32.50 per fathom; the vein in this stop will average 18 in. wide of good ore. No. 2 stop measured 9 fms. and is re-let at \$39 per fathom; the vein here will average 9 in. wide, of very rich ore. No. 3 stop measured 11 fms. 32 ft., and is re-let on account of our having to raise a chute to convey the rock to the level below; the vein in this stop is small, but very rich. No. 4 stop is a new stop, in back of the 400 ft. level, and just behind the present west stop, and is let to a party of four men, at \$25.50 per fathom; the vein here will average 12 in. wide of rich ore. The stops below this 400 ft. level (Batters' ledge) are yet held in reserve, the same to be very extensive. When our facilities for milling are increased this and other ore in reserve will be extracted.—Levels: In the 400 ft. west level the vein is 9 in. wide, and looking well; this contract of 100 ft. is not yet completed. In the 400 ft. west level the vein is small, but rich; the contract of 100 ft. is not yet completed. In the 400 ft. east level the contract measured 56 ft.; the vein here is rather poor; contract not re-let, but will be as soon as convenient. The above levels are on Batters' ledge. In the 500 ft. west level (Buel North Star ledge) the vein is 8 in. wide, and yields rich ruby ore (silver). Cross-cut—400 ft. south and 550 ft. North: There is no change in these cross-cuts worthy of remark; the contracts are not yet completed.—New Contracts: To raise 50 feet from the 400 ft. level, or connect with No. 5 stop, by four men, at \$27 per foot. To drive east of No. 5 stop, and carrying 10 ft. of the vein, by two men, at \$10 per foot; the vein here looks well. The quantity of ore raised in July month is about 120 tons, 40 tons of which are ready for the Manhattan Company's mill; 60 tons to be assayed, more or less; 6 tons 200 lbs., valued at \$4000, is shipped to the rail-

road for Liverpool. The mine continues to look well—in fact, much the same as it did one month ago. Our operations here have so far been attended with success, while our future looks equally promising, and the most rigid economy is exercised in all our works.

NOVA SCOTIA COAL.—The directors of the Glasgow and Cape Breton (Nova Scotia) Coal and Railway Company notify that by the mail recently arrived from Cape Breton they have heard that the railway has been opened to the reserve mine, and that coal is being carried for this company, and also for the Lorne Company; that the two steamers chartered by this undertaking were rapidly loading from their pier, for shipment to Halifax, coal from the reserve mine. Mr. Gibson was en route for Canada and the United States, expecting to arrange for sales of coal in quantity. The market prices were favourable, with an upward tendency. An order had been received from the Grand Trunk Railway Company to send 200 to 300 tons of coal, to be tested for locomotive purposes.

[For remainder of Foreign Mines see to-day's Journal.]

MENZENBERG MINE.

The directors of this company, wishing to obtain the best practical evidence of the prospects and remuneration for their outlay before erecting the machinery to work the mine in depth, instructed Mr. John Kendall, of Redruth, and Capt. Joseph Michell, of West Jewell Mine, to carefully inspect and report on the mine. The following are the reports of those gentlemen, and which will be acted upon with vigour:—

This extensive mine set is situated between the two rich mines, Alter Fritz and St. Josephberg; the latter mine was very rich for copper, and the same lodes traverse this mine north and south; but it is uncertain to say which of the two lodes in Menzenberg Mine. Dickins', or the main lode, is the same as the rich lode in St. Josephberg, but the character of the lodes in each mine is the same, and they are embedded in the same rock—killas, or clay-slate—which is very congenial for the production of mineral; therefore, there is reason for believing that each of these lodes may prove equally as productive as the rich St. Josephberg lode. The present development of the mine consists of a shaft being sunk from surface 25 fathoms, or 2 fms. below the adit level. This shaft is sunk to the east of the main lode, which underlies towards the shaft; it is calculated that by sinking the shaft from 15 fms. to 18 fms. deeper the main lode will be intersected; this point will be much deeper than the old workings on this lode. I am informed that a good lode of ore was left in these old workings, and taking this into consideration, with the fact that the lode was so large to the surface, and so much ore taken from it, I have no doubt a good lode of ore will be found when the lode is intersected in the shaft.

In sinking the above shaft a lode (now called Dickins' lode) was intersected about 10 ft. below the surface, and having an underlie adit; the shaft was sunk through it 25 ft. below where it was first seen, leaving the lode on the east side of the shaft. In the adit level, 23 fms. from surface, a cross-cut is now being driven east from the shaft towards Dickins' lode, and have about 8 fms. more to drive to intersect the same; it is estimated that this will take about four to six weeks to be accomplished; and, judging from what can be seen of the lode in the shaft, and from what is raised from the lode at the surface, a quantity of some 50 tons, containing some very rich grey copper ore, I am led to believe that a rich lode will be found at the point of intersection, which will be about 30 fms. from surface, taking the underlie of the lode into consideration.

I would recommend you to prosecute vigorously the sinking of the shaft to intersect the main lode, as it is a very important point that this lode should be proved in depth; also to drive with all possible speed the cross-cut at the adit level east from shaft, in order to intersect Dickins' lode, and, if found productive, to sink a shaft on the same from surface for the purpose of ventilation and facilitating the taking of the copper ore. At present I should confine the operations to working on these north and south copper lodes, and driving in the same. By doing this the east and west lead lodes will be intersected, and can be driven on from the main lode to Dickins' lode, a distance of 18 fms. This would prove the value of these lodes, and at the same time answer the purpose of seeing Dickins' lode at deeper levels, and drain the same of water.

In conclusion, I should remark that this mine has the advantage of being cheaply worked, the wages for manual labour being much less than in Cornwall. The mine is also situated on the slope of a hill, into which levels can be driven, which would carry the lodes to be worked at surface (a distance of about 30 fms.) free of water charges. The mine being close to the Rhine, and about a mile from a railway, affords great facilities for carriage. I visited St. Josephberg and other rich copper mines in the district, and find the character of the lodes identical with that of this mine, and the same as I have seen in other rich foreign mines that I have inspected. Therefore, it is my strong opinion that this will prove a very profitable mine.

The following is Capt. Joseph Mitchell's report:—"The above-named mine (Menzenberg) in company with Capt. John Kendall, of Redruth, Cornwall, I inspected very carefully underground and above, and have great pleasure in handing you my report on the same. This mine is very extensive, and is situated in fact quite large enough for two sets, is situated between two rich mines—St. Josephberg and Alter Fritz—the former mine immensely rich for copper ore. The same lodes traverse this mine (Menzenberg), the character of the lodes being precisely the same, consequently similar results may be reasonably expected, and it is my firm belief in a short time, say six months, if this mine is vigorously prosecuted it will turn out quite equal to its rich neighbour, St. Josephberg. The development of the mine is rather limited, at the same time no more can be done until you get your engine at work, when the sinking of the engine-shaft (Dickins') should be carried on with all the force that can be brought to bear, in order to get below the late workers workings, where you are safe to find, in my opinion, a rich course of copper ore, which will well reward you for your outlay. In conclusion, I beg to say that the work now being carried on is being done in a miner-like manner, but the question is whether a smart and intelligent Cornish mine agent would not be for your consideration to engage, for the further prosecution of this valuable property. I should say yes, particularly as you are now about to erect an engine.—JOSEPH MITCHELL, West Jewell Mine, St. Day, Cornwall, Aug. 29."

MINING AND METALLURGICAL ENTERPRISE IN SPAIN.—A proposition is now being made to develop with British capital some extensive coal and iron properties in the province of the Asturias, and a lead property in the Estramadura. The first property consists of a smelting-works, with the iron and coal mines belonging to it, situated upon an important coal field, so that fuel may be said to be obtainable without cost of transport; and, as the climate is healthy and temperate, the cost of living cheap, and the soil fertile, the managers would find their occupation very agreeable. The property is bounded by a river well stocked with fish, and close to woods, which afford excellent shooting. When the railway from Leon to Gijon is in operation, which will be by the middle or, at latest, end of 1873, the works will be but 48 kilometres from a large shipping port. There is all the necessary plant and material for the manufacture of 5000 tons of iron per annum, and by increasing the plant (ore and fuel being in hand) the production could readily be increased five-fold. The ore gives from 35 to 45 per cent. of metallic iron, and richer qualities could easily be obtained. The coal mines are divided into two groups, upon one of which the smelting works are established, and the other is connected with a seaport by a railway. The mines are about 3000 hectares in extent, and at present yield from 60,000 to 80,000 tons of coal. There is also a steelworks, where excellent metal is made, and which is capable of great extension. The same proprietors are also offering some valuable silver-lead mines in Estramadura, 28 kilometres from a railway station, 550 kilometres from the port of Lisbon, and 180 from coal mines, also accessible by railway. They are 128 hectares in extent, and contain five known veins from 1 metre to 4 metres thick. Only one is at present worked, yet it has yielded 24,000 to 30,000 quintals of ore per annum. There are seven principal shafts, and much useful work in the way of opening the mine has been done. The washed mineral gives on the average 70 per cent. of lead and 7 ozs. of silver per quintal. It is considered that with adequate capital from 100,000 to 125,000 quintals per annum could be raised, giving a gross revenue of 180,000, to 200,000. The third section of the property, comprising the Asturian coal mines, is from 5000 to 6000 hectares in extent, and situated in the coal formation of the Asturias, and is almost vertical, and run at right angles to the valleys, taking a north-east and south-west course. There are about eighty known seams, varying in thickness from 40 centimetres to 1-20 metre, all the seams being above the level of the water. The coal generally is bituminous, giving 62 per cent. of coke and 5 per cent. of ash. Some of the seams, however, produce gas coal. Seven blast furnaces are already working with coke from native coal. As soon as the railway is open the cost price, taken through the shipping port, will be from 5s. to 6s. the ton. One pound of the coal, taken through and through, evaporates 8½ lbs. of water, and picked coal 7½ lbs. The coal of this field is employed in the iron and steel works, and in the manufacture of coke. The returns from the property would be immediate, and the profit would depend entirely upon the amount of capital employed.

PETROLEUM.—It is computed that the consumption of this oil in the world in 1871 exceeded 6,000,000 barrels; in 1869 it was only 4,800,000, and in 1870, 5,290,000 barrels. The increase in consumption is attributed to the lowering of prices. The rate of consumption must depend upon the price at which the article can be furnished. When the price becomes high, shale oil will compete with petroleum, and also the common olive oil, and rapeseed oil. The result of observations in Pennsylvania shows that wells continue to produce for about three years, and then dry up. The reduction from the original flow is under five barrels a day per well, a great reduction, at least 10,000,000 acres. A large amount of territory has recently been discovered, states that at the beginning of this year the number of wells drilling in Pennsylvania was 469, and the number throughout the United States, 556. Great economy in the production of petroleum has resulted from the application of cast-iron tubes to the wells, instead of barrels; the oil is thus carried over the various inequalities of surface for three or four miles to the tanks on the railroads, and is used in them by steam-engines. The price of transport is thus reduced one-fifth. The great difficulty is the want of machinery for working engines and illuminating purposes. The Consul states that the oil regions are 100 miles in length by 30 to 50 in breadth, and the number of wells to be tapped so great that the supply is considered to be sufficient for a century to come at the least. The export of petroleum, naphtha, and benzene from the port of Philadelphia to foreign countries in 1871 amounted to nearly 56,000,000 gallons, of the value of \$13,257,865.

MOULDING BOXES.—The invention of Mr. JOHN COOPER, of Birmingham, consists in providing the moulding box with a series of loose fitting metal linings, the said linings being fixed to and liberated from the moulding box at pleasure by means of screws, wedges, or other fastenings. The linings described are made in halves, and after being dropped into the two halves of the moulding box are secured thereto by the fastenings described. The sand is then rammed in the lined half-mould boxes, and the half-moulds formed in the ordinary way. The two half-mould boxes are then fitted together, and the fastenings of the linings are then removed, leaving the two half-moulds upon one another in their proper positions, supported by the linings. The mould is now ready to be used in the ordinary way for casting. By this invention any number of moulds may be made by the use of one moulding box, provided with linings and fixing apparatus for same.

Meetings of Mining Companies.

LLYWERNOG COMPANY (LIMITED)—NEW CONSTITUTION.

The statutory general meeting was held at the Victoria Hotel, Euston, on Monday.—Mr. ALEX. BRIDGE in the chair. The notice of meeting was read, and the report of the directors, which stated:—

This meeting is held primarily in accordance with the 39th section of the Companies Act, 1867, which provides that every company shall hold a general meeting within four months after its Memorandum of Association is registered; consequently, although the commencement of the workings of the property which this company holds dates back several years, the company itself must, under such clause, be treated as a new undertaking.

The former company worked this lead mine to 72 fms. deep, and raised several hundred tons of lead ore; however, its capital became exhausted in the early part of the present year, and resolutions were passed to wind-up voluntarily. A liquidator was appointed, and a special authority given to him to sell and to transfer the lease of the mine, the machinery, plant, &c., in exchange for, and to receive in consideration thereof, 20,000 shares of 1s. each, credited as 15s. paid of the present constitution; and a further authority was given to distribute or allot the said 20,000 shares, but first to such of the members of the old company as might be willing to accept the same in exchange share for share. The managing director has reported to your directors that possession of the works was duly obtained—that 15,728 shares have been allotted; that a call of 1s. per share, making those shares 16s. paid, was made, payable on April 25; and that the workings of the mine have been continuous; while the agent's report, which accompanied the notice of meeting, amply evidenced, in the opinion of the directors, the improving character of the lodes in depth.

At a board meeting held in London, on May 22, after reading a report from the resident agent of the previous day's date, the managing director stated that, in the event of the present satisfactory character and value of the lodes continuing, it would, in his opinion, be necessary to substitute a 50-ft. diameter water-wheel for the present 40-ft. wheel, for economy in pumping the mine, and for crushing its ores; and to place the 40, or, at any rate, a larger wheel, for the purposes of drawing the stuff to surface; the necessity for which, the board would remember, was also referred to in the special reports recently made upon the workings of the mine. On this recommendation the board resolved to give the managing director authority to make such alterations at his discretion, and that thereafter the main shaft of the mine should, as quickly as practicable, be sunk to the level of 168 ft. from surface.

In consequence of such resolution, a special notice has been given for this meeting to consider and resolve on the issue of 1274 shares, 15s. paid, at the rate of 10s. per share; and to create a reserve account of the then remaining 3000 shares, which reserve account, if resolved upon, shall not be hereafter disturbed, except by and on the authority of a special general meeting of the members, duly convened to consider the same.

The directors submit this report for adoption, and recommend the issue of the shares as stated, fully believing, from present indications that all the requirements of the company will be covered with the credit of the said 17,000 shares.

The agent's report was read, as follows:—

Aug. 14.—Settings for August: Engine-shaft: The 72 west to six men, at 100s. per fathom. The lode here is much of the same character and value as when reported on last week, and worth from 20 to 25 cwt. of lead ore per fathom. The 72 east of north cross-cut to four men, at 180s. per fathom. This end still continues to produce a little lead, and is letting out a large stream of water. The winze in bottom of 63 west to four men, at 180s. per fathom. The lode in this winze will produce 1 ton of lead ore per fathom. The winze in bottom of the 50 west to four men, at 180s. per fathom, which is producing 15 cwt. per fathom. The cross-cut going south from this level is now 2 fms. 5 ft., and is re-set to four men, at 180s. per fathom. This cross-cut, though a branch of lode 4 in. wide, containing lead ore, worth about 3 cwt. per fathom. Two men to drive and stop over the 40 west, at 150s. and 70s. per fathom respectively, which will produce fully 15 cwt. of ore per fathom. We sampled 20 tons of lead ore last Saturday for sale on the 19th inst.—JOHN EVANS. (Sold at 12½ 10s.)

Upon the proposition of Mr. RAMSDALE, the report of the directors was received and adopted.

Resolved,—That the issue of the remaining portion of the shares representing the capital of the company be at present restricted to 1274 shares, making the total issue 17,000; that such shares be offered to the members, *pro rata*, at 10s. per share, and, for acceptance on or before the 15th proximo, in the house, but the directors be authorised thereafter to issue any which may remain unclaimed to the general public.

Resolved,—That a reserve account of shares be opened; that the 3000 shares numbered 17,001 to 20,000 be placed thereto, and that such account be not hereafter disturbed, except on the vote of a majority of the members present at a general meeting specially convened to consider the propriety of the future issue of such shares.

Resolved,—That the directors be severally re-elected.

Resolved,—That Mr. Thomas Mackie be appointed auditor.

A vote of thanks to the Chairman closed the proceedings.

RYHMNEY IRON COMPANY (Limited).—The annual meeting was held on Wednesday, when a dividend of 2½ 10s. was declared on each 50s. share, and 15s. on each 15s. share, free of income tax.

EAST WHEEL BASSET.—At a meeting, on Aug. 28, the accounts showed a debit balance of 568½ 0s. 10d. A call of 2s. per share was made. Capt. John Lean says:—"The tribute department is without much alteration for some time past. We have sold since the last meeting 161 tons 12 cwt. 2 qrs. of stoneware, which realised 102½ 19s., and have about 400 tons of stuff piled on the mine, which will produce on an average 18½ lbs. of tin to the ton of stuff (about 3 tons 2 cwt. of tin). The engine-house for the stamping engine is complete, and the loading is also finished. All the heavy work of the engine is in the house, but there is a large amount of work to be done about the dressing-floor, burning-house, &c. Materials and labour are greatly risen in price, and the latter is scarce at almost any price, so that many things cannot be carried out as fast as desired. On the whole, I think the prospects of the mine are improving as we develop the eastern ground."

SOUTH WHEEL CROFTY.—At the meeting, on Monday, the accounts for April, May, and June showed a debit balance of 4020½ 4s. 2d. A call of 2s. per share was made. The award of Capt. Simmons as to the compensation to be paid by the East Pool adventurers to South Wheel Crofty adventurers adjudged the sum of 2102½ 11s. 2d. to be paid by East Pool. The question of the amount of dues payable in this mine, which are heavier than those in the adjoining mines of the district, having been considered, Messrs. T. S. Bolitho, George Williams, and W. Shilson were appointed a special committee to lay the matter before the several lords, or their agents, for their consideration and decision. Mr. E. H. Rodd (the party) says:—"For want of means of returning tin in larger quantities, from the new stamps not being as yet available, the credits for tin have been wholly inadequate to meet the expenditure, and although there is an immense quantity of tin-stuff waiting to be returned, valued at 2000½, I cannot ascertain that there is any probability of the new stamps being available for another six weeks, and then only partially. [The agents' report will be found among the Mining Correspondence.]

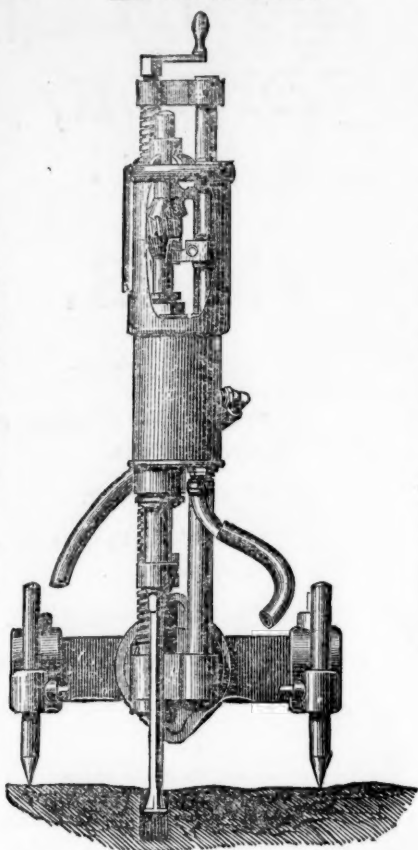
[For remainder of Meetings see to-day's Journal.]

TAMAR CONSOLS.—Mr. Henry Ellery, in describing a visit to the Tamar Consols Silver-Lead Mines, situated in the parish of Lifton, near Lanneston, formerly called Galloway, says:—"A perpendicular shaft has been sunk from surface 27 fms.; and in this shaft a north and south lode has been intersected, about 2 feet wide, with lead and mudiic. A cross-cut has been driven south from the bottom of the shaft, which intersected an east and west lode, where levels were extended some distance; and it is confidently reported that a branch of lead 8 inches wide, worth 20s. per fathom, stands entire, and which cannot be wrought on until the mine is drained to that depth. The resuscitation, or more recent operations, by the company now called Tamar Consols commenced by driving the old adit some 30 or 40 fathoms, and communicated with the engine-shaft which drained the mine 4 fathoms from surface; and in the course of driving a portion of an east and west lode was discovered, which has recently been cut into and opened by cross-cutting, when a good lode of rich silver-lead was discovered, in places worth from 15s. to 20s. per fathom, and from which about 10 tons of rich lead ore has been extracted and now at surface; the lode still retaining a most encouraging appearance. It is proposed to drain the mine to the bottom and prosecute to a greater depth. On close inspection, the killas and other component parts of the lode assimilate so closely to all right indications for rich deposits of lead that we may be justified in saying Tamar Consols gives genuine evidence and flattering prospects of a rich and lasting mine. The origin of the concern is also worth noticing. When the farm-house and buildings were erected several fine stones of lead ore were found in the excavations for the foundation, which led to an application for the sett." Mr. Ellery adds that, having no interest whatever in the mine, the foregoing may be regarded as perfectly disinterested and independent.

LEVANT MINE (St. Just).—A substantial dinner has been given to the various workmen employed in the erection of the new 45-inch cylinder pumping-engine (supplied by Messrs. Harvey, of Hayle), and which during the past few days has been set to work, and will perform the important task of draining this extensive concern to the deepest level, which is somewhere about 260 fms. below the bed of the Atlantic Ocean. In order to convey in a more intelligible form the idea of the depth of this mine it might be stated that it is equal to seven times the height of the Monument of London. Some idea of its former wealth may be gained from the fact that in March and April, 1859, nearly 50000 worth of copper was raised at a tribute of 4s. 10d. in 1½, besides tin.

NEW BORING APPARATUS.—The apparatus contrived by Mr. Bosworth for the Sub-Walden Exploration differs in some respects from that which is generally employed. He drives by steam a cutting tube, a sort of closed augur, at the end of an iron rod, weighted on the top, and fresh joints of rod are screwed on between the augur and the weight as they are required. The augur itself is about 2 feet long; and it produces a perfect cone of the strata through which it has passed. Mr. Bosworth has also contrived a boring to a depth of 2000 feet; and he exhibited to the Geological Section some cylinders of rock that his augurs had brought up, rock so hard as to be almost polished by the friction required to cut it. When great depths are attained, the revolution of the rod at the top of the bore is not immediately communicated to the augur, but may be said to take time to reach it, so that the rod twists. Theoretically, each 20 feet of rod make a three-quarter turn before communicating the rotation to the portion below; so that every 100 ft. require six complete revolutions at the top before the augur feels the movement. The workmen soon learn to tell, by the sensation communicated by the rod to the hand, whether the augur bites, and at a depth of 100 feet, if it did not bite on the completion of six, or at most seven or eight, revolutions it would be pulled up, and a faulty joint of the rod looked for and removed. In theory, of course, the six turns would be distributed over the whole length of the rod; but the iron is not perfectly homogeneous, and so, in practice, it is the weakest or softest part of the rod that receives all, or nearly all, the twist, and that would break if the twist were carried too far. Mr. Bosworth has contrived an ingenious device for seizing and dragging up the lower portion of the rod and the augur. If at any time the rod should break, but it is better, and more economical in practice, to anticipate a breakage, and to replace any portion of the rod that may twist instead of communicating the rotation. For the mere surface soil the augur is 9 inches in diameter, but a 3-inch augur soon replaces the first, and in deep borings is itself replaced by one of 2 in., or of only 1 in., in diameter.

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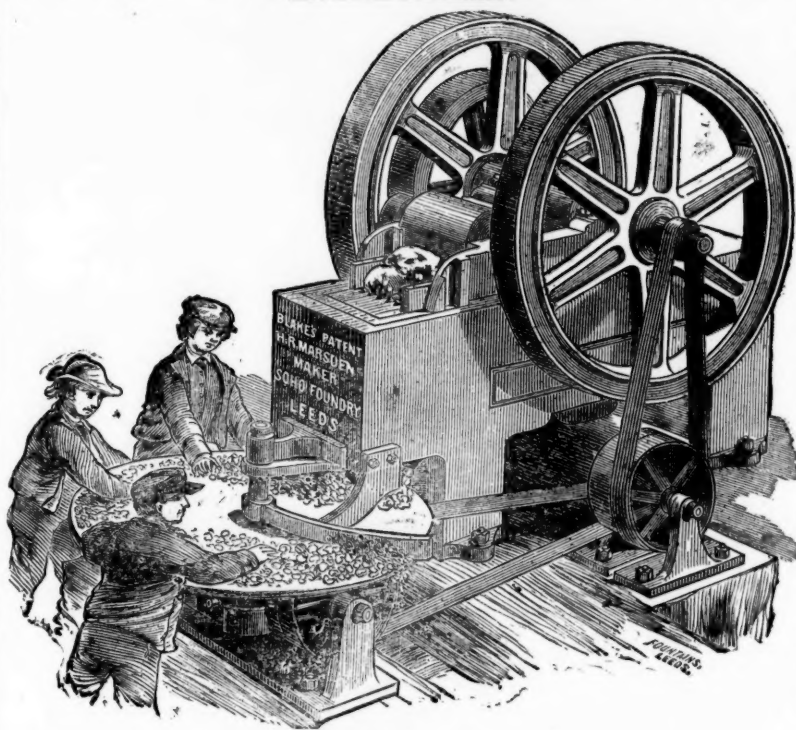
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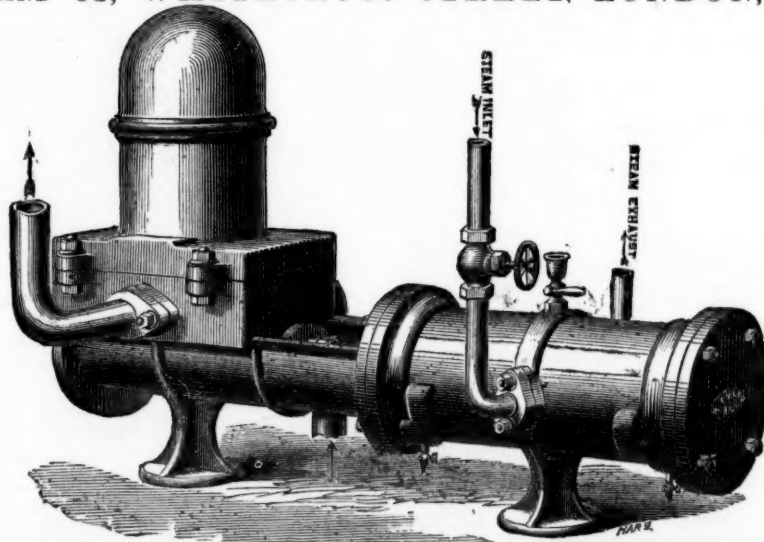
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Tottenham Local Board of Health, Tottenham, 12th December, 1870.

Aston Main Coal Company, near Sheffield, 1st December, 1871.

Rhos Llantwit Colliery, Caepphill, near Cardiff, March 4, 1872.

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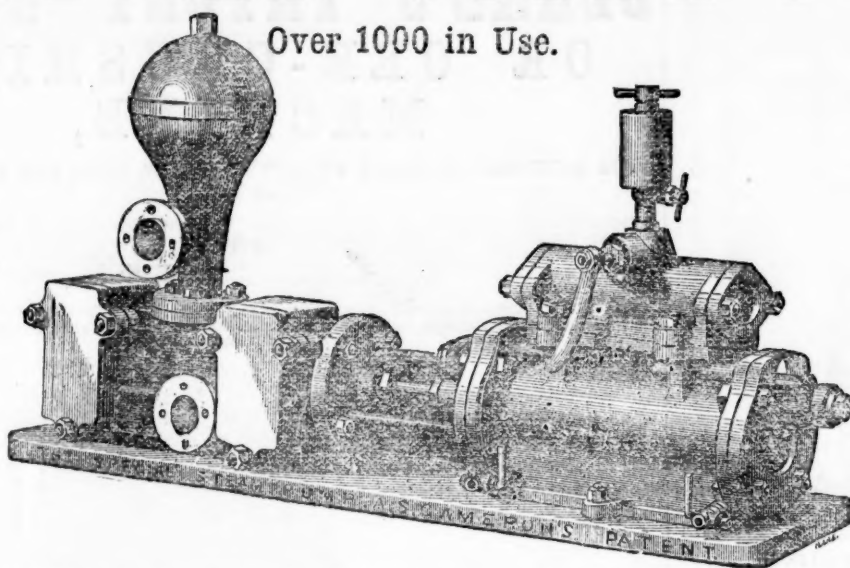
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IN USE AT THE FOLLOWING QUARRIES:—

Carnarvon and Bangor Slate Co. ...	5 Pumps.
Kellow, J. E., North Wales Slate Co. ...	1 "
New Zealand Quartz Crushing and Gold Mining Company ...	1 "
Scott, R. W., Dungannon, Ireland ...	1 "
Foster, J. S., Hebburn Quarries ...	1 "

IN USE AT THE FOLLOWING CHEMICAL WORKS:—

Alum and Ammonia Co., Bow Common	2 Pumps.
Barnes, W. C., Hackney Wick ...	2 "
Burt, Boulton, and Hayward, Tar Works, Millwall ...	1 "
Cory and Co., Manor-street, Old Kent-road ...	2 "
Whiffen, Thomas, Battersea ...	1 "
Jones, W., and Co., Middlesborough ...	4 "
Jarrow Chemical Co., South Shields ...	1 "
Richardson, J. G. and N. H., Jarrow-on-Tyne ...	1 "
Read, Holliday, & Sons, Huddersfield	1 "
Sheldon, Nixon, and Co., West Jarrow	2 "
Tennant, C., and Co., near Newcastle	7 "
Webb, H., & Co. (Manure), Worcester	1 "
Union Chemical Company, Stratford ...	1 "



NOTE.

Requires NO Shafting, Gearing, Riggers, or Belts.

All Double-Acting:

Works at any Speed, and any Pressure of Steam.

Will Force to any Height.

Delivers a constant stream.

Can be placed any distance away from a Boiler.

Occupies little space.

Simple, Durable, Economical.

IN USE AT THE FOLLOWING COLLIERIES:—

Adelaide Colliery, Bishop Auckland ...	3 Pumps.	North Bitchburn Colliery, Darlington ...	2 Pumps.	Stott, James, and Co., Burslem ...	1 Pump.
Acomb Colliery, Hexham ...	1 "	Newton Cap Colliery, Darlington ...	1 "	Seaton Delaval Coal Company, near Newcastle	1 "
Blackfell Colliery, Gateshead ...	1 "	Normanby Mines ...	1 "	Thornley Colliery, Ferryhill ...	1 "
Black Boy Colliery, Gateshead ...	1 "	Oakenshaw Colliery ...	1 "	Thompson, John, Gateshead ...	2 "
Castle Eden Colliery ...	2 "	Pease's West Colliery ...	2 "	Trimdon Grange Colliery ...	1 "
Crofton, J. Ct., near Ferryhill ...	1 "	Pease, J. and J. W., near Crook ...	5 "	Tudhoe Colliery ...	1 "
Carr, W. C., Newcastle ...	4 "	Pease, J. and J., Brandon Colliery ...	1 "	Vobster and Mells Colliery ...	2 "
Etherley Colliery ...	1 "	Pegswood Colliery, near Morpeth ...	2 "	Widdrington Colliery, Morpeth ...	2 "
Gidlow, T., Wigan ...	3 "	Pelton Fell Colliery ...	1 "	Whitworth and Spennymoor Colliery ...	3 "
Haswell, Shotton, and Easington Coal Co.	2 "	Railey Fell Colliery, Darlington ...	1 "	Westerton Colliery, Bishop Auckland ...	1 "
Lochgelly Iron and Coal Company ...	1 "	Right Hon. Earl Durham, Fence Houses	1 "	Wardley Colliery, Gateshead ...	1 "
Leather, J. T., near Leeds ...	2 "	Skelton Mines ...	1 "	Westminster Brymbo Coal Company ...	2 "
Lumley Colliery, Fence Houses ...	1 "	South Beaulieu Colliery ...	4 "	Weardale Coal and Iron Company ...	6 "
Monkwearmouth Colliery, Sunderland ...	1 "	St. Helens (Tindale) Colliery ...	1 "		

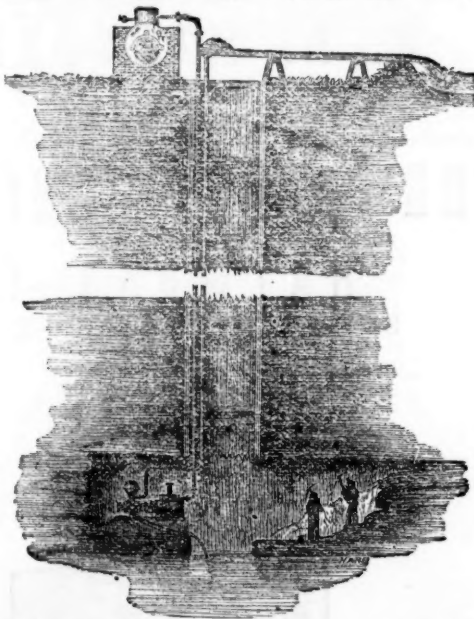
IRONWORKS AND ROLLING MILLS:—

Bede Metal Company, Jarrow ...	11 Pumps.	Gilkes, Wilson, Pease, and Co., Middlesboro' ...	2 Pumps.	Whitwell and Co., Stockton ...	3 Pumps.
Bagnall, C. and T., Gosmont Ironworks	2 "	Lloyd and Co., Middlesborough ...	1 "	Whessoe Ironworks, Darlington ...	1 "
Consett Ironworks ...	2 "	Solway Hematite Iron Company, Maryport	1 "	West Cumberland Hematite Iron Company ...	1 "
Castleford Foundry Company, Normanton	1 "	Vaughan, Thomas, Middlesborough ...	2 "	Westbury Iron Company ...	1 "
Ellen Rolling Mills, Maryport ...	1 "	The Shotts Iron Company, Edinburgh ...	1 "		

THE "SPECIAL" STEAM PUMP AS APPLIED FOR DRAINING MINES.

The arrangement in the accompanying illustration shows an economical method of draining mines without the expense of erecting surface-engines, fixing pump-rods, or other gearing. A boiler adjacent to the pit's mouth is all that is necessary on the surface; from thence steam may readily be taken down, by means of a felted steam-pipe, to connect the pump with the boiler. The pump may be placed in any situation that may be convenient for working it, and connecting the steam, suction, and delivery pipes.

These engines can be fixed and set to work in a



comparatively short time, and also at a very small outlay. They are used in large mines as auxiliary engines, and will be found invaluable adjuncts in all mining operations.

To estimate the quantity of water to be raised by any given size of pump refer to the tabulated list below. It is recommended to use long-stroke pumps where the height exceeds 100 ft., so that the largest result may be obtained with a minimum wear and tear of the pump pistons and valves. The pumps are provided with doors for ready access to all working parts.

PRICES OF THE "SPECIAL" STEAM PUMPS.

Diameter of Steam Cylinder	inches	2½	3	4	4	6	6	6	7	7	7	8	8	8	8	10	10	12	12	14	16	26
Diameter of Water Cylinder	inches	1½	1½	2	4	3	4	6	5	6	7	4	6	7	8	6	7	8	10	8	7	6½
Length of Stroke	inches	6	9	9	12	12	12	12	12	12	12	12	12	12	18	12	12	18	24	48	24	72
Strokes per minute		100	100	70	50	50	50	50	50	50	50	50	50	50	35	50	50	35	—	—	—	—
Gallons per hour		810	680	815	3250	1830	3250	7330	5070	7330	9750	3250	7330	9750	13,000	7330	9750	13,000	—	—	—	—
PRICE		£10	£15	£20	£35	£30	£40	£47 10	£50	£52 10	£57 10	£50	£55	£65	£85	£70	£80	£100	—	—	—	—

IF BRASS LINED, OR SOLID BRASS OR GUN-METAL WATER CYLINDERS, WITH COPPER AIR VESSELS, EXTRA, ACCORDING TO SIZE.

Any Combination can be made between the Steam and Water Cylinders, provided the Lengths of Stroke are the same, thus—8 in. Steam and 3 in. Water, or 10 in. Steam and 3 in. Water, adapted to height of lift and pressure of steam, and so on.

TANGYE BROTHERS & HOLMAN, 10, Laurence Pountney-lane, London, E.C.